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DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.

The Future of British Railways

THE present moment is an opportune one for taking stock of the position of the railways in this country. A revival in traffics after a long trade depression; the regularisation of labour conditions; the successful recourse for the first time to the Rates Tribunal, and finally a promise of legislation to bridle road competition, all contribute to the possibility of forming an opinion as to future prospects. Mr. A. J. Stevens, whose long acquaintance with the financial side of railway affairs peculiarly entitles him to special knowledge of the subject, has published his views on this question in a book, "The Future of British Railways," which we review on another page. A foreword by Sir Josiah Stamp condenses the whole history of the subject in a page or two and affords an introduction to the main points elaborated in the book. Mr. Stevens's work, written mainly for the railway stockholder, is an epitome of the events which since amalgamation have contributed to place the railways in their present position. To the patient investor it will be some consolation to find that the author, with all the weight of his undoubted knowledge of the subject, inclines to an optimistic view of the future. He thinks that if only the necessary co-opera-

tion can be maintained between the three groups, the public, the employees, and the stockholders, with some regulation or co-ordination of road competition, they will all benefit from the improved conditions, and not least, the long suffering stockholder.

* * * *

Thomas Herbert Rendell

The death on December 28 at the age of 86 of Mr. T. H. Rendell, who was Chief Goods Manager of the Great Western Railway for eight years and afterwards General Manager of the Barry Railway, makes another gap in the ranks of those prominent railwaymen who did so much to place British railway commercial practice on a sound footing. Mr. Rendell, whose career with both companies is the subject of a Personal paragraph on page 123, played a leading part in the strenuous work associated with the revision of railway rates under the provisions of the Railway and Canal Traffic Act, 1888. Becoming Chief Goods Manager in 1904, he gave evidence in that capacity before many parliamentary committees, and the Railway and Canal Commission. In 1912 he became General Manager of the Barry Railway Company, which position he held until early in 1919 when he was elected to the Board of Directors. He remained a Director until January 1, 1922, from which date the Barry Railway Company was amalgamated with the Great Western Railway under the provisions of the Railways Act, 1921. Mr. Rendell was very popular with the staff, for whose welfare he had the greatest regard. He was associated with many staff societies and was the first President of the G.W.R. Lecture and Debating Society. During his retirement he lived at Slough, where his greatest interest was gardening. He was a member of the Royal Horticultural Society and the grounds of his house were beautified by many rare plants.

* * * *

The Week's Traffics

Coal contributes £68,500, merchandise £25,500, and passenger train traffics £13,000 to the combined increase of £107,000 in receipts shown by the four main-line railways for the past week. This added to the previous week's increase of £83,000 makes a total increase of £190,000 for the first two weeks' working of the year. Total takings for the past week were L.M.S.R. £1,181,000, L.N.E.R. £875,000, G.W.R. £487,000, and Southern Railway £355,000, representing increases over the corresponding period of last year of £57,000, £33,000, £10,000, and £7,000 respectively.

	2nd Week				Total	Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	£		Inc. or Dec.	%
L.M.S.R. ..	+ 12,000	+ 7,000	+ 38,000	£	+ 57,000	+	99,000 + 4.47
L.N.E.R. ..	+ 4,000	+ 9,000	+ 20,000		+ 33,000	+	51,000 + 3.12
G.W.R. ..	+ 8,000	+ 10,000	+ 8,000		+ 26,000	+	25,000 + 2.66
S.R.	+ 5,000	+ 500	+ 2,500		+ 8,000	+	15,000 + 2.19

Great Northern (I.) traffics for the past week, totalling £16,400, show an increase of £100. Great Southern total traffics at £78,993 show an increase of £258. Mersey Railway receipts total £4,574, an increase of £131, Liverpool Overhead £1,420, an increase of £202. London Transport receipts amounted to £566,100, an increase of £15,200.

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National Railways of Mexico, Progress in 1937

During the first nine months of 1937 the operating results of the National Railways of Mexico, which concern comprises some 78 per cent. of the total railway mileage in Mexico, showed an increase of \$13,996,258 in income over the same period of 1936, due principally to

improved freight and passenger traffics. Expenses also increased, but less rapidly than gross earnings, with the result that net earnings from railway operations increased \$3,901,038. The gross earnings of the National lines amounted to \$107,541,245 during this period, compared with \$93,544,987 in 1936, an increase of 14.96 per cent. Operating expenses rose from \$77,106,172 to \$87,201,392 or 13.09 per cent. the increase in net earnings being 23.73 per cent. These figures, taken from our American contemporary, the *Railway Age*, are given in Mexican dollars. The substantial increase in general business resulted in an increase in expenditure for enginemen's wages, fuel, lubricants, &c. During 1937 agreements with employees were entered into which add approximately \$9,000,000 a year to the wage bill. Notwithstanding this, expenses did not increase in the same proportion as gross earnings, so that in the first nine months of 1937, 16.54 per cent. of the total revenues remained as net earnings, as compared with 11.35 per cent. in 1936.

* * * *

Rohilkund & Kumaon Railway

The report for the year ended September 30, 1937, shows an increase in net earnings of Rs. 1,21,020, as gross receipts were higher by Rs. 2,92,262, and working expenses by Rs. 1,71,242. The Rohilkund and Kumaon Company works the Lucknow-Bareilly State line in addition to its own, and its share of the net earnings for the year under review amounted to Rs. 19,30,973, compared with Rs. 19,14,932 in the previous period, producing, with the gain on remittance, £158,316, against £156,168 in 1935-36. Stockholders will again receive a dividend and bonus amounting to 18 per cent. as in the previous period.

	1936-37	1935-36
Mean mileage	573	573
Passengers	6,976,062	6,653,177
General merchandise, tons ..	1,567,755	1,518,052
Operating ratio, per cent. ..	44.93	44.39
	Rs.	Rs.
Coaching receipts	28,12,576	26,59,900
Goods traffic receipts	45,23,989	44,35,659
Total earnings	77,19,025	74,26,763
Working expenses	34,68,039	32,96,797
Net earnings	42,50,986	41,29,966

The projected extension from Kashipur to Kalagarh is still in abeyance. The sum of £1,000 has been subscribed to the Bengal and North Western Railway Company's Compassionate Fund, and a further amount of £9,000 has been allotted to the London Staff Contingency Fund, making this fund up to a total of £24,525, to meet the several contingencies which would have to be provided for should the company's contract be terminated in 1942. The Board has appointed Sir James Williamson, the Company's late agent in India, to be Secretary, in place of Lt.-Col. W. R. Izat.

* * * *

New South Wales Railways Quarterly Report

The New South Wales Government Railways report for the quarter ended September 30, 1937, shows an increase in earnings of £357,306 and in expenditure of £168,775 in comparison with the corresponding quarter of 1936. The number of passengers increased by 2,631,131 and train mileage by 245,838. Coaching earnings were higher by £79,958 and goods receipts by £260,840, while the tonnage increased by 487,054. Operating ratio improved from 69.38 to 67.66 per cent. Construction work continued on the three sections of new line, St. James to Wynyard, Sutherland to Cronulla, and Sandy Hollow to Maryvale, while two survey parties were working on the proposed line Bungendore to Captain's Flat. On the first named line, eight caissons were

completed, and the excavation for Harrington St. road bridge was practically finished. The culvert, earthworks and bridge work on the Sutherland line were continued and on the Sandy Hollow line work was begun at Wollard Gap tunnel. As regards open lines, drainage improvements were continued on the North Coast lines and openings were strengthened at several places on the system. Thermit welding equal to nine miles of single track was completed.

* * * *

The Construction of Railways

Mr. A. S. Quartermaine, Assistant Chief Engineer of the Great Western Railway, compressed into the compass of a paper to the Railway Students' Association on January 13 all the essential information on the construction of railways. He pointed out that whereas in the early days new lines were projected to provide rapid transport between important towns, now railway construction is confined chiefly to the provision of cut-off lines, widenings, and to cater for the expansion of great cities. The first consideration governing the construction of a new line is its probable cost, and the data upon which estimates are built up were specified by Mr. Quartermaine. The next step, after the decision to undertake the work has been made, is to deposit the estimate and plans of the line with Parliament. Assuming assent, drawings and specifications are then prepared, and the work is generally put out to tender. Mr. Quartermaine then outlined the method of procedure normally followed by the contractor, and gave informative notes on the methods of construction adopted for various works, with special reference to tunnels, viaducts and earthworks, right up to the final stage of laying the permanent way. May it be presumed that Mr. Quartermaine's omission to mention the most modern type of bottom ballasting, *i.e.*, sand or ashes, was due to his knowledge that students of economics seldom become engineers?

* * * *

Woking and the L.S.W.R. Centenary

Saturday, May 21 next, will mark the centenary of opening of the railway between London (Nine Elms) and Woking—the first section of the old L.S.W.R. This historic date was mentioned at a recent meeting of the Woking Council, when Councillor H. W. H. Jones pointed out that this year was a momentous one in the history of the town. He proposed that some form of celebration should take place, and said he had been in touch with the Southern Railway, but was not in a position to disclose its intentions. Councillor A. D. Campbell said the proposal was a serious one. Woking owed its present prosperity to the railway, and he would like to see the Council taking steps to celebrate the occasion. Councillor Ian Dalgleish, Chairman of the General Purposes Committee, suggested that his committee should consider the matter at its next meeting, and this was unanimously agreed. When Woking railway station was opened, it is stated that there was only one porter, who acted as ticket collector, signalman, and goods agent. Some of the earliest trains brought large numbers of passengers to Woking to see bare-knuckle prize fights on the meadows near the Beacon at Maybury. Woking remained a terminus only until September 24, 1838, when the next section of the London & Southampton line—Woking to Winchester—was opened. In 1840 Edward Mogg said in his description of the line: "The Woking station is provided with waiting rooms for the accommodation of passengers, is furnished with additional engines for a change, a store of fuel, force-pumps, and all the necessary appliances for putting in motion the carriages of the company." At the present time Woking station is being rebuilt.

An "Exhibition Season" for Scotland?

A correspondent puts forward a suggestion by which visitors to the Empire Exhibition in Glasgow this year might be assisted to make full use of the facilities for seeing all parts of Scotland offered by the railway companies. His proposal is that there should be issued season tickets valid for a fortnight to all Scottish stations on the L.M.S.R. and the L.N.E.R., and available to holders of monthly return or tourist tickets from stations beyond the border. Probably, however, his scheme could be modified to remove what at present reads like a ban on the Scots themselves. The proposed price for the fortnightly seasons is £4 third class and £6 first class, these rates covering all railway-owned steamers in Scotland as well. Apart from its attractions to the public, our correspondent suggests that the scheme would be welcomed by all concerned with the exhibition organisation, as helping to relieve pressure on the hotels in Glasgow itself; and the existence of such a facility would probably help the sale of tickets to Glasgow by tourist agencies abroad. By way of precedent, he recalls the "all stations" seasons issued on the North Eastern Railway before the war. Railway plans for handling Glasgow exhibition traffic are already being announced, and those of the L.M.S.R. are reviewed on page 127.

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Rheingold versus Edelweiss

Hitherto the Rheingold Express of the German Mitropa Company and the Edelweiss of the International Sleeping Car Company have conducted something like a neck-and-neck race between Amsterdam and Basle, the former by way of Cologne and the Rhine, and the latter through Brussels, Luxembourg, Metz, and Strasbourg, and in the summer season the through portions to and from Zurich and Lucerne have been conveyed on the same Swiss trains beyond Basle. Furthermore, as we have previously pointed out, both the Rheingold and the Edelweiss have offered comfortable journeys between London and the northern parts of Switzerland in connection with the L.N.E.R. steamers to and from Harwich, the former *via* Hook of Holland and the latter *via* Antwerp. The competition is likely to be considerably intensified, however, by the radical acceleration which is planned to take place from May 15 next of the Rheingold service, as described on page 108 of this issue. By an arrival an hour earlier in Basle, it will be possible to get as far afield as Lugano by 10.29 p.m., and Chur by 8.34 p.m. (2 hr. 51 min. earlier than previously) the same night; and a northbound departure from Basle at 12.21 noon instead of 9.18 a.m. (though with unchanged arrival at Liverpool Street) will be in connection with trains leaving Lugano at 6.8 a.m., Interlaken at 8.30 a.m., Berne at 10.8 a.m., Chur at 7.43 a.m., so accelerating the through journey by fully three hours. The difficult gradients of the Edelweiss route will make it difficult to give an adequate reply to this revolutionary speed-up of the German competitor.

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Trans-American Publicity "Voyage"

A remarkable publicity coup to bring to the notice of the whole of the United States the new 17-car streamlined diesel express, City of Los Angeles, has been staged by the Chicago & North Western and Union Pacific lines. A "special holiday voyage" has been arranged for this luxury train, not from Chicago westwards, but from New York to Sun Valley, Idaho, America's most popular winter sports centre, a distance of 2,683 miles. It will be remembered that we described and illustrated this most up-to-date train in our issue of August 27 last, and it was scheduled to go into regular service between Chicago and

Los Angeles on December 27. By arranging with the Eastern railways for the train to run through to New York and be on exhibition at the Grand Central station there on December 18—prior to its leaving for Sun Valley on December 19—the owning companies ensured the widest possible publicity. Also, the holiday voyage is, we believe, the first occasion upon which a diesel streamlined train has carried paying passengers from New York City to the West. The booked time for the 2,683 miles was 2,730 min. The advertisements of this trip state that "famous sports enthusiasts and prominent business personages—names that make news—will be on board the City of Los Angeles streamliner on this history-making voyage." On page 122 we publish an illustration of this remarkable 17-vehicle train on its way to New York prior to the exhibition and "voyage."

* * * *

The Boiler and the Axle-Load

The new 4-6-0 locomotives recently completed and shipped from this country for express passenger train service on the Bengal-Nagpur Railway, are noteworthy in that their design is based on the attainment of maximum boiler and engine capacity on the wheel arrangement referred to, within the limits of a 17-ton coupled axle-load. Those with experience of locomotive design will know that it is not the easiest of tasks to provide, within such a weight limit, a boiler capable of providing steam at 200 lb. pressure to a pair of 21½ in. by 26 in. cylinders, developing a tractive effort of approximately 28,000 lb. The article on pages 110-113, together with the drawings and other illustrations therewith reproduced, will suffice to show that the design of the new Bengal-Nagpur engines, whilst not presenting any novel or even unusual features, nevertheless exemplifies the development of detail in accordance with up-to-date experience, as for example in the excellence of the front end arrangement. In addition, we would call attention to the general layout of the boiler as shown in the sectional drawings on the folding plate, and the ratios appearing in the text; also to the fact that the cylinders and steamchest covers can be removed and the pistons and valves withdrawn, without interfering with or taking down other parts. The design has behind it the combined knowledge and experience of an eminent firm of consulting engineers, and those of a high-class British firm of locomotive builders.

* * * *

Terminal Medley

Is there any public place which contains so much of interest and where one can see such a cross-section of life as a big railway station? We all must have had such thoughts, but the idea struck us with particular force last week as we beheld the medley of peoples and personalities passing through the Victoria terminus of the Southern Railway. Number two platform was thronged with men and women bound for the winter sports centres across the Channel. They were clad in gaily-coloured ski-ing costume, complete with seven-league boots and enormous haversacks, with of course their skis recumbent. Nearby, affording a striking contrast, queues of children were passing through the barrier of number eight platform to join the special train to take them back after the Christmas holidays, to the Deaf and Dumb School at Margate. A day or two later the Foreign Secretary arrived at Victoria, and on Sunday Mr. Bunny Austin, the English international lawn tennis player, was leaving for the South of France, while on Monday there was a poignant scene when Haile Selassie bade farewell to his wife on her departure for Jerusalem. The tears and laughter of life are vividly reflected in the passing traffic of a railway station.

Railway Air Services Activities

IN December, 1936, the Maybury Committee, which had been appointed to consider the development of civil aviation in the United Kingdom, emphasised the importance for the future of extended co-ordination and co-operation between aviation and surface transport. It was strongly urged that it would not be in the public interest if competitive or alternative services were introduced, and further merging of interests by the principal companies was recommended. In the light of subsequent events, it is interesting to examine the activities of the British railways along these lines. Air powers were granted by Parliament to the four main-line companies in 1929, and, after the Great Western Railway had run an experimental air service between Birmingham, Cardiff, and Plymouth in 1933, Railway Air Services Limited was formed in the following year to inaugurate a number of services as representing the four main-line companies in co-operation with Imperial Airways. In 1934, also, air services were started between London and the Isle of Wight by Spartan Air Lines in conjunction with the Southern Railway. Since that date R.A.S. Ltd. has increased substantially the number and mileage of its services, and it now operates between London, Birmingham, Manchester, Liverpool, Belfast, and Glasgow, with connecting services to Bristol, Cardiff, Exeter, Plymouth, Southampton, and Brighton. Of these services, however, only those between London, Liverpool, Belfast, and Glasgow, with a connection for Manchester, Blackpool, and the Isle of Man, are operated throughout the year, the others running during the summer months.

In January, 1937, Coast Lines Limited, which provides steamboat services within the area served by R.A.S. Ltd., became closely identified with the railway companies in connection with the development of the London, Belfast, and Glasgow service. Subsequently the Great Western and Southern Railways became associated with Channel Islands Airways Limited, which controls Jersey Airways Limited, and Guernsey Airways Limited. Towards the end of 1937 the L.M.S.R. co-operated with the Isle of Man Steam Packet Company and other concerns in forming Isle of Man Air Services Limited, which operates services to the Isle of Man from the North of England, Scotland, and Northern Ireland. Further negotiations are, it is understood, in progress between the London Midland & Scottish Railway and a number of surface and air transport companies under which two new air transport organisations are being formed to rationalise air services across the Irish Sea, as well as to the Western Isles, the Orkneys and Shetlands.

The policy of co-ordinating air and surface transport activities was carried an important step further on January 14, when representatives of all these air transport companies met in London to formulate plans for the inter-availability of tickets, and the handling of baggage as between the railways and the respective air lines. Timetables are also being closely examined by the air transport organisations to provide through connections between the various services. Since the commencement of operations by Railway Air Services Limited, the mileage flown annually has shown a substantial increase, but, although the number of passengers carried during 1937 will probably show a slight increase over 1936, it is unlikely that the financial results will prove more satisfactory. This is due principally to the fact that owing to the fast and convenient train services in Great Britain, and the distance of most aerodromes from towns, the additional cost of air travel is not justified by the amount of time saved, except in those instances where a sea passage is involved or the route connects with an important overseas service.

Whatever may be the future of civil aviation in Great Britain, however, the railway companies can fairly claim that they have made a substantial contribution to its development.

* * * *

Nigerian Railway

WE have received a copy of the annual report of the Nigerian Railway for the year ended March 31, 1937, from the General Manager, Mr. J. H. McEwen. Historically the year marks the twenty-fifth anniversary of the linking up of what were previously two separate railways in Northern and Southern Nigeria respectively, known as the Lagos Government Railway and the Baro-Kano Railway. The route mileage of the combined railways has grown from 1,265 in 1925 to 1,900 in 1937. The outstanding feature of the year was the remarkable increase in revenue which rose from £1,966,000 in the previous year to £2,693,000. This is the highest revenue ever recorded for the railway, except for the year 1929-30. During the year, in consequence of the policy of putting the railway on a commercial basis, the interest charges on a certain section of the eastern side of the railway which was built largely for development purposes have been taken out of the railway accounts. As a result of this, coupled with the increased traffic, a large surplus on the year's working was obtained. This surplus has been retained and utilised in making good past failures to contribute to renewals.

The following table gives the principal statistics:—

	1934-35	1935-36	1936-37
Gross receipts	£2,020,736	£1,966,012	£2,693,401
Expenditure	£1,054,177	£1,338,296	£1,175,368
Operating ratio	52.01	68.07	43.64
Interest on capital	£1,047,173	£1,048,729	£783,396
Contribution to renewals	—	—	£662,025
Reserve fund	—	—	£70,000
Passengers carried	5,080,016	7,938,995	8,425,716
Tonnage conveyed	660,615	709,102	891,848

Out of the total receipts, £2,315,000 was obtained from freight traffic, the extremely low third class fare of $\frac{1}{4}$ d. a mile accounting for the comparatively small figure for passenger traffic. Owing to the reduction of facilities necessitated by the slump, considerable problems had to be faced in handling the suddenly increased traffic, amounting to 37 per cent. over the average for the previous six years. The principal difficulties arose in connection with power and with congestion at the ports. The latter factor in turn caused a wagon shortage. Additional Garratt engines were obtained during the year. There was a short labour stoppage at the colliery, and in order to conserve coal supplies an investigation of the passenger train service in the Lagos area was undertaken, as a result of which it was found that certain trains could be eliminated and the weight of others reduced.

Road competition continues to be a serious problem, but a Transport Advisory Board has been created, and it is hoped that future road construction will develop along non-competitive lines. The procedure being adopted to deal with the problem is quoted in full in the report, and is of interest. In the meantime immediate steps are being taken to enforce the law and to introduce certain modifications. The railway administration operates road feeder services in the northern provinces, and these continued to produce good results, so that additions to the fleet have been authorised. Almost every commodity handled showed an increase, with the exception of cotton, and this was affected by bad weather conditions, and owing to farmers planting ground nuts in consequence of the enhanced price, rather than cotton. An important item of reorganisation occurred during the year. Hitherto the officers in charge of the railway operated docks at

Port Harcourt and Lagos were directly responsible to the railway management. As a result of the appointment of a Director of Transport with co-ordinating powers over all forms of transport, the dock traffic superintendents have been placed directly under him.

As regards locomotive performance, the following figures are of interest:—

	1934-35	1935-36	1936-37
Pounds of coal per engine-mile ..	75.80	73.60	76.90
Engine-miles per day per main-line engine in service ..	85.0	90.0	104.0
Pounds of coal per 1,000 gross trailing ton-miles ..	302.0	327.0	308.0

The miles per day per engine in service show a very satisfactory increase. Improvements have been made in the cost accounting methods in the workshops. A considerable amount of new construction in the carriage and wagon section was undertaken. The reclamation of scrap was undertaken by the railway on organised lines at a special depot. A programme has been embarked upon with a view to strengthening a number of bridges. Electric welding of points and crossings has been introduced. The output from the railway colliery amounted to 310,000 tons.

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New Zealand Government Railways

THE improvement in the trade and industry of the Dominion was reflected in the gross earnings of the New Zealand Government Railways for the financial year ended March 31, 1937. The revenue earned, £7,790,651 (£786,335 higher than in 1935-36) was the largest since the record year 1929-30. Working expenses at £6,886,793 were £933,954, or 15.7 per cent., higher. The surplus of revenue over expenditure was secured notwithstanding the concessions in the way of wage and salary restoration conceded to the staff and the general application of the eight-hour day, but the percentage of total working expenses to gross earnings rose from 84.99 to 88.40. Net revenue represented a return of 1.65 per cent. on capital invested, but were insufficient by £1,405,896 to meet the interest charges at 4½ per cent. During the year the sum of £204,412 was charged against revenue for renewals and the amount expended from this account for track renewals was £206,480. The sum of £615,125 was charged against revenue on account of depreciation. The principal statistical figures relating to working are given in the accompanying tables, and these refer to railway operations only:—

	1936-37	1935-36
Miles open	3,320	3,320
Train miles	11,868,083	11,050,376
Passengers, ordinary ..	8,284,956	7,963,824
Goods tonnage	6,212,907	5,618,477
Operating ratio, per cent. . .	91.81	88.46
Passenger receipts	1,611,305	1,466,617
Goods traffic receipts ..	4,846,417	4,359,750
Operating earnings	6,903,604	6,243,519
Operating expenses	6,338,385	5,523,193
Net earnings	565,219	720,326

Passenger journeys (ordinary and season) increased by 4.31 per cent., passenger revenue by 9.87 per cent. and passenger train miles by 6.73 per cent. It is noted that the financial year covered two Easter periods, whereas last year the bookings for only one Easter were included. On the other hand the epidemic of infantile paralysis in the south island in December, 1936, had a disastrous effect on passenger traffic, the loss from this cause being estimated at not less than £100,000. In receipts from goods and livestock there was an increase of 11.16 per cent., and 10.09 per cent. in tonnage. Goods train mileage was

7.91 per cent. greater and the average haul increased from 72 to 73 miles. Average revenue per ton mile was slightly higher at 2.37d. as was the average revenue per ton at 14s. 5d. Road motor services, which have been considerably extended during the period under review, produced a profit of £21,698, as compared with £8,598 in the previous year. With the acquisition of several privately owned motor services, the Department now operates 70 buses, 96 service cars, 18 lorries, and 9 motorcars. On branch lines the operating loss, after allowing for the main line "feeder value" of the traffic, was £88,802. An extensive rolling stock construction programme is in hand to meet the increasing traffic requirements, but, unfortunately, the building of a large number of additional wagons was delayed owing to the high pressure at which the British manufacturers have been working. Seven "K" class locomotives were completed during the year; 43 engines were fitted with the new type of Waikato spark arrester, and 25 speed recorders are being fitted on "AB" class locomotives. The total number of staff at March 31, 1937, including those engaged on works charged to capital, was 20,729, as compared with 17,908 in the previous year.

The Minister of Railways, Hon. D. G. Sullivan, in presenting the report, refers to the Government's railway policy which he says is grounded on the belief that there is no adjunct of material progress that is so generally important as the railway system. Probably no country owes more to its railways than New Zealand, and these great lines of communication were constructed as a developmental agency rather than as a profit-making institution. The Minister refers also to road competition and says that the policy of the Government is to secure a measure of co-ordination which will avoid overlapping and duplication of services and give the public the best of both methods of transport at the most equitable price.

* * * *

The Canadian Railways

THE *Ottawa Journal*, in a recent leading article significantly headed "Too Much Railway?" reviews at some length the causes and effects of the present railway problem in Canada, but doubts whether the suggested unification of the two principal systems would form a satisfactory solution. The proposition seems to be that there is more track and more equipment than can be used profitably, but the *Journal* maintains that Canada's transportation system is not and never can be a matter of profit and balance sheets; it is unthinkable that the rails should be torn up in any outlying district and the people deprived of their means of transport, just because the railway working does not show a profit. The article continues:—

In a country like Canada, where it is vital to maintain the geographical, economic, and political integrity of Confederation, a transportation system maintaining that integrity is something we must be prepared to pay for. . . . Transportation is a national service in the precise sense that aids to navigation are a national service, or our national post office. . . . In the circumstances what is this clamour about our railway problem? There is no mystery about it. We could solve it tomorrow if we were prepared to do one of two things: (1) tear up tracks and abandon our own people; or (2) make users of the railways pay more for what they get.

According to the advocates of unification neither of these "solutions" is necessary. On the same day (December 8) as the *Ottawa Journal* expressed the opinion quoted above, Sir Edward Beatty, the President of the Canadian Pacific Railway, speaking at a luncheon at Windsor, Ontario, said that the solution of the problem lay in the unification of the Canadian National Railways

with the Canadian Pacific. Sir Edward's speech is referred to in our Overseas columns this week, and it will be seen that he is not only emphatic on the desirability of unification, but considers it inevitable because conditions of public finance are forcing it on the nation. His suggestion is that the amalgamated system should be confided to the Canadian Pacific Company, which would operate the two railways jointly and for the joint account of their owners. To the extent that the suggested amalgamation would render subsidies unnecessary and avoid any increase in charges, it would, no doubt, command the approval of people and Parliament. But when Sir Edward Beatty mentions retrenchment of 17 per cent. of the staff, and implies that the railways would provide that amount less employment in future, the matter is brought down to a realistic basis from the point of view of the individual who depends for his income on employment. It also suggests curtailment of services, which, again, would not be welcomed by those directly affected. Indeed, it seems from a reference to the question in a recent article by *The Times* Ottawa correspondent, that it may be developing into a major political issue, with the Conservative party pledged to the amalgamation of the two systems under C.P.R. management, in the face of considerable opposition.

This question of railways in Canada will recall, at least to the older generation of railway investors in Great Britain, the fate of the old Grand Trunk Company and the almost interminable sequence of legal proceedings and arbitrations, which endured for long after the Dominion Government had taken over the line. The Grand Trunk Railway of Canada was amalgamated in 1923 with the Canadian National Railways, the latter being the successor of the Canadian Northern, which had become the National Company in 1918. Canada has an exceptionally extensive network of railways. The actual mileage, of standard gauge, is 42,270 miles, of which the Canadian National Railways account for 23,684 miles and the Canadian Pacific for 17,223 miles. The increase in railway development in the Dominion was most remarkable between the years 1910 and 1920, when the total rose from 24,731 miles to 38,805, with a further rise to 42,205 by 1930. The Canadian National receipts for 1936 amounted to \$186,610,489 and the total operating expenditure to \$171,477,690. The Canadian Pacific Company's figures were respectively, receipts, \$138,562,763; expenses \$115,251,652. The Canadian Pacific Company's ancillary services, such as steamers, hotels, land, &c., are of course an important part of the company's undertaking.

* * * *

The Human Element

FROM that liability to make mistakes which is described as the "failure of the human element," there is no hope of our ever being free. Railways have therefore been compelled to build up in the course of time a series of precautions and checks, in the form of carefully devised regulations and well-constructed appliances, leaving as little chance as is reasonably possible for those in charge of the running of the trains to commit an error capable of leading to a mishap. This is particularly the province of the signal engineer, and for this reason Mr. F. Horler's instructive paper "The Human Element," read before the Institution of Railway Signal Engineers on November 10, afforded a welcome comment on an aspect of the work of its members hitherto but little touched on in its proceedings, showing how varied are the ways in which the uncertainties of human action can seriously interfere with, let alone defeat, the purpose of many in themselves efficient safety appliances. The essential problem of sound

railway operation will always remain the same, that is how to make certain of having the right type of man in the right class of work, imbued with a due sense of responsibility and resolved faithfully to carry out his instructions. Without such a foundation we cannot hope to build up reasonably effective barriers against liability to accident, but given it and the help of good appliances, of which there is now no lack, we can do so. We are indeed doing it very well. The public has no cause to complain of the standard of safety it enjoys on the railways today, and when an accident happens people are disposed to make allowances, knowing that the most conscientious individual may deceive himself at times.

Mistakes all men must make, and they are fortunate if they are in positions where they can lead to little harm. Against true mistakes it is sound practice to provide all the checks we can. Carelessness is another matter. Fortunately we seldom meet with deliberate carelessness, but we do from time to time encounter that menacing sort springing from a lack of appreciation of what can happen and the easy assumption, without making enquiry, that things are right, or that some apparatus has failed when it has not and is delivering the very warning it was designed to give. Against such weaknesses our chief weapon must be education, as is becoming more and more recognised. In the past, we venture to think, insufficient attention was given to this and too little use made of the lessons which accidents, and the narrow avoidance of them, can teach. We have been satisfied with possibly a good course of instruction covering the normal routine of a man's work, but have not incorporated in it the warnings contained in the mistakes already made by others in actual practice, but which, if fully explained to him, would put him more on his guard against blundering in the same way. There is room, we feel, in the training of railwaymen of all classes for more to be done in this respect. Although the signalman is mostly thought of—at any rate by the public—when accidents are discussed, he is, as Mr. Horler emphasised, far from being the only individual concerned. A driver's blunders can lead to consequences fully as disastrous as those of any signalman, and we can all recall cases of signals being ignored which never have been, and are never likely to be, satisfactorily explained. So, too, the engineering department has its "human element" at work, liable, for example, to misjudge the time when some part of the track will need renewal, or to keep in insufficient adjustment a piece of apparatus which, failing, leads some man into a dangerous course of error.

It has often been said that in eliminating the human element from the signal box, for instance, we only transfer it elsewhere. In a sense this is true, but the opportunities for mere momentary forgetfulness to do harm are generally much restricted thereby. The responsibility of those charged with the installation and maintenance of railway equipment is nevertheless very great, and here again our surest guarantee of safety must ever be a sound system of first selecting men and training them afterwards for every class of service. In the last resort the human element can be got rid of only by getting rid of human beings themselves, and hence the utmost we can expect to provide is the most approved devices for enabling responsible men to do their work correctly in comfort, and to check them whenever the ineradicable tendency to err manifests itself. Such principles cannot be applied by hard and fast rules. They must be adapted to circumstances, and here differences of opinion will inevitably arise; but as long as they continue to be the fundamental basis of their rules and equipment the railways can justifiably expect their clients to be satisfied with the steps taken to ensure their safety.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Atomiser Cylinder Lubrication

36, Manor Drive, Doncaster
January 16

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the descriptive article given in your issue of January 14 (page 66) of the Atomiser Cylinder Lubrication for Locomotives developed by the L.M.S.R., there seems to be a mistake in the general drawing (Fig. 1). Surely the steam control cock *B* is coupled up the wrong way round.

In Fig. 2 sectional details are given, and it is obvious, if this is correct, the valve in Fig. 1 would always be open, no matter which position the control cam (connected to the drain cocks) is in.

Yours faithfully,
W. WHYMAN SMITH

[In the sectional detailed drawing (Fig. 2 on page 67) of the control cock *B*, the arm on the cam spindle is, for the sake of clearness, shown in a horizontal position, but actually when coupled up on the engine, this arm occupies a vertical position, as shown in Fig. 1. In these circumstances, the system of rods shown on the general arrangement drawing, gives a correct movement of the steam control cock in relation to the position of the cylinder cocks.—ED. R.G.]

Local Services on Main Lines

Welwyn Garden City,
January 3

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Until a few weeks ago the 6.55 p.m. from King's Cross reached Welwyn Garden City at 7.36 p.m. and continued thence as a stopping train to Hitchin, where it arrived at 8.1 p.m. Owing to the introduction of the West Riding Limited, which leaves King's Cross at 7.10 p.m., the starting time of this train has been advanced to 6.52 p.m., while its arrival at Welwyn Garden City has been extended to 7.39 p.m. This has been done to allow the West Riding Limited to overtake the Hitchin train between Potters Bar and Hatfield, though in practice there is frequently a delay of some minutes outside the latter station. What is more the 6.52 p.m. now waits for six minutes at Welwyn Garden City, in order that it may be passed by the 7.15 p.m. from King's Cross, which also runs to Leeds. The journey time between King's Cross and Hitchin (where it arrives at 8.17 p.m.) has thus been extended from 66 min. to no less than 85 min.

The L.N.E.R., like the L.M.S.R., is therefore improving its main line trains at the expense of its local services, a policy which as Mr. Watkin rightly points out, is against the public interest. The results of this policy could be illustrated by many other examples from this part of the system, as those who travel on it daily know only too well. The basic trouble is that the tracks and stations are inadequate to carry the traffic. King's Cross is only just capable at normal times of accommodating the trains which run into and out of it. The result is that at holiday seasons the starting point of a number of the regular trains is shifted to Finsbury Park, and some indeed disappear altogether. When the weather is foggy delay soon degenerates into chaos.

May I, therefore, very humbly suggest that the directors, instead of introducing further luxury trains, should seriously consider the provision of four continuous tracks at least between King's Cross and Hitchin and the reconstruction of Hatfield Station which is a constant source of delay to down trains? Alternatively they might consider making more use of the avoiding line *via* Hertford. This was, I believe, built

to relieve the main line but is not employed for that purpose except when there is an accident.

Yours faithfully,
WELWYN

London,
January 3

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I am sorry that Mr. Watkin's letter, in your issue of December 31, gives support to the idea that acceleration of long-distance services is liable to involve "disastrous effects on local" trains, which can be overcome only by heavy capital expenditure by or on behalf of the railways. Nothing, of course, is further from the truth, and it would indeed be unfortunate if a sentence—quoted, apparently, without context from a railway company's reply to a County Council complaint—were taken to support such a view. Every main-line acceleration—every alteration, in fact—is liable to cause the re-timing of local services, and in the case under notice, where a length of 19½ miles from Luton to Bedford with four intermediate stations has to be used by fast and slow passenger trains alike, the timetable compilers have exceptional difficulties to surmount—these difficulties, indeed, were specially mentioned in an article on the accelerations published in your issue of September 24 last.

But what has actually happened between Bedford and Luton is that the running time of non-stop trains has been reduced from 22 to 19 min. and, assuming punctuality and a due regard for local services by the compilers of the new timetable, it would require a very large increase in the number of expresses passing over the section to cause the elimination of one local train. Even if there were such an increase, there is still the possibility that, with a more frequent express service fixed intervals could be adopted which would secure margins for stopping trains (as has been the case between Guildford and Portsmouth)—apart from electrification possibilities or the use of fast-moving railcar units for local work—and to argue that on portions of steam main lines to the north, with only a double track, local and long-distance services cannot be kept abreast of modern requirements merely indicates that the operating authorities and the timetable compilers are not tackling their problems successfully. In the instance Mr. Watkin quotes, so long as a stopping train from Bedford to Luton requires 35 min. for the journey, a margin of at least 27 min. (on the new schedules) would be necessary between the express it follows and the one it precedes. The gap between the two expresses concerned in the working of the vanished 4.48 from Bedford is now only 26 min., but there are many ways of overcoming this difficulty without drastic alteration of the slow train, and Mr. Watkin can see, by examination of the timetable, what openings still remain for the running of stopping trains from Bedford to Luton.

Yours, &c.,
VIATOR

King's Cross and Yorkshire

198, St. Helen's Road,
Hastings, Sussex
January 6

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I was very interested to read the proposals of "Vitesse" contained in his letter to you which is published in the December 24 issue, and I may perhaps be permitted to offer a few comments.

Several of the principal ordinary King's Cross-Leeds, &c. trains have now worked to unaltered schedules for many years and they have grown in several cases to unwieldy proportions. There will be general agreement, I think, as to the

need of a good down Yorkshire service between the uncomfortably early 7.25 a.m. and the cumbrous 10.10 departures from London, giving a quick connection to Hull and Tees-side as well as to the West Riding. The old-established 5.30 p.m. ex-Leeds, arriving King's Cross 9.25, often loads from Doncaster to colossal length and weight, with consequent risk of unpunctuality and discomfort, though the Pacific engines work wonders; so that an accelerated division of this train for London passengers seems desirable. Perhaps such a plan would meet the wishes of the majority better than the mere addition of a later express to the existing service. I am afraid another fast train running into King's Cross at about 1.30 p.m. is quite out of the question under present conditions. There are now important long-distance arrivals there at 1.3, 1.15, 1.24 and 1.47: with a semi-fast at 1.37, a Cambridge buffet-express at 1.42, calling at Welwyn Garden City, and streamlined flyers following in at 2.0 and 2.15. Suburban trains bound for King's Cross local station have to traverse the same up main line for some distance outside. The 1.3, 1.24, and 1.47 frequently run in two parts during summer and at other busy times so that track and platform pressure is now very considerable; indeed, owing to the broken and limited extent of auxiliary passenger lines north of New Barnet, intermediate stations such as Stevenage, Knebworth, and Welwyn North get a very poor service to London about this time on account of express priority. Similarly, the down line or lines through Hertfordshire, &c., are already pretty fully occupied from 5.30-7.30 p.m. when paths *must* be available, with allowance for starting and stopping time, for the growing outer suburban residential traffic.

I venture to suggest that the proposed high-speed service such as your correspondent indicates serving Huddersfield and Sheffield should operate to and from Marylebone; also that the Yorkshire Pullman should be left as it is—at any rate until an extensive trial has been given to the new southbound facilities from the N.E. area, *via* York, which are a useful addition to the winter service especially. The amended times of running, including the Hull section, appear popular and to operate successfully. I fear that an arrival in the Yorkshire spa about 10.30 p.m., by means of a section of the West Riding Limited, would be far too late for the average London-Harrogate traveller. The 9.0 a.m. Leeds-King's Cross portion is usually very short and contains no refreshment-car. These vehicles, I believe, return as part of the cosmopolitan 4.0 p.m. down.

During the busy afternoon and evening hours a complete re-drafting of the Great Northern section main-line timetable would afford an opportunity of better spacing of through express and stopping trains; but clever would be the man who—in *practice*—could effect the all-round improvement desired in certain quarters while at the same time reconciling the claims of high-speed, ordinary express, semi-fast, stopping and suburban passenger trains, together with a volume of freight traffic varying almost as greatly in speed and weight. It is a most engrossing problem!

With the season's greetings to you and your associated staffs,

I am, Sir,

Yours very truly,

R. A. H. WEIGHT

The Sud Express

London, W.2, January 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I read with interest the notes which appeared on page 1248 of your issue of December 31, 1937, regarding the running of the Sud Express between Paris and Lisbon.

It is, however, not generally realised that a trip to Portugal by means of the Sud Express, or any other train through Spain is a rather irksome affair, and involves many tedious preliminaries in connection with the papers which it is necessary for an intending passenger to obtain, to enable him or her to cross "Nationalist" Spain. A British citizen, for instance, has to apply first to the Home Secretary to obtain permission to cross Spain. In the case of a foreigner residing in this country, he (or she) has first to obtain a similar per-

mission from the foreigner's own authorities (*i.e.*, the embassy or legation of the respective country), after which, producing that permission, he (or she) has to apply for an additional permission to the British Foreign Secretary.

Once these permissions to cross Spain have been granted to them, both the British citizen and foreigner must apply to the Nationalist authorities at an office called *Nachosena* located at St. Jean de Luz, in France, which issues the transit permits to foreigners. These permits are issued with delays ranging from 3 to 14 days and entitle the holder only to pass through Spain, without any intermediate break of the journey. The Nationalist representative in London does not issue transit permits.

These, however, are not the only difficulties. No through tickets are issued from either London or Paris to Portugal and no travel agency whatsoever is able to state the exact fare from, say, London to Lisbon.

The Sud Express, moreover, is not and never has been a through train, due to break of gauge at the Franco-Spanish frontier. What is more, passengers and luggage have now frequently to go on foot or by taxi from Hendaye to Irun—a distance between stations of about 1½ miles—when communications are interrupted due to strained relations between France and Nationalist Spain. Occasionally when the frontier is closed altogether passengers are left stranded at Hendaye.

Strictly speaking, there is no through connection by the Sud Express, as the Spanish *rápido* connects at Irun with the French *rapide* leaving Quai d'Orsay at 8.45 a.m., and arriving at Irun at 8.30 p.m., 29 min. earlier than the Sud Express. In the reverse direction the *rápido* arrives at Irun at 9.15 a.m., and Hendaye at 9.40 a.m., connecting with the French Sud Express, leaving the latter station at 11.4 (arriving at Paris at 8.48 p.m.) and also with the *rapide* leaving at 1.49 p.m., which reaches Quai d'Orsay at 11.45 p.m.

It will therefore be seen that the overland connections between this country and Portugal are full of difficulties and delays, and, at any rate for the time being, the journey by sea is advisable.

E. A.

The Johore Causeway

Essex House, Essex Street,

Strand, W.C.2,

December 17

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR.—In the article entitled "The Federated Malay States Railways" in THE RAILWAY GAZETTE of December 17, 1937, it is stated that the causeway across the Johore straits to the island of Singapore was opened in September, 1933. This must be a mistake as I travelled across the causeway both by train and motorcar in November and December, 1931.

Probably "1933" was a printer's error for "1923" as the "Illustrated Guide to the Federated Malay States" published by the Malay States Information Agency and dated 1923 says: "A causeway carrying a road and the railway over the Johore Strait is under construction and should be completed during 1923."

Yours faithfully,

KENNETH BROWN

[We are indebted to Mr. Kenneth Brown for pointing out the error of date in our article. The causeway connecting the island of Singapore to the mainland at Johore Bharu was opened in 1923. The introduction of the train service on October 1 of that year was recorded in THE RAILWAY GAZETTE of October 5, 1923. The causeway, some 3,465 ft. long, was built on rubble, and to provide for the passage of small craft a lock 170 ft. long and 32 ft. broad, widening inside the gates to 45 ft., was constructed at the Johore end; a rolling lift bridge carries the railway and roadway across the lock. The work was begun in 1919 and was carried out by Topham, Jones & Railton Limited, of London, the firm which had recently completed large harbour works at Singapore and therefore had all the necessary plant at hand. The causeway was described briefly in our issue of January 18, 1924.—Ed., R.G.]

PUBLICATIONS RECEIVED

Investor's Pocket List of Reference Tables, 1938. London: Fredk. C. Mathieson & Sons, 16, Copthall Avenue. E.C.2. 6½ in. × 3½ in. 14 pages. Limp cloth. Price 1s.—This handy little pocket book is again available for investors, in the same form as in previous years. The principal features are as usual a perpetual yield table; a table for working out the yield on £1 shares; stamp transfer duty; income tax tables; fractions and decimals of £1; interest tables; and the scales of brokers' commissions. Altogether an extremely useful little book for investors and others.

The Future of British Railways. By W. J. Stevens. London: P. S. King & Son, 14, Great Smith Street, S.W.1. 7½ in. × 5 in. × ⅝ in. 101 pp. Price 5s. net.—Sir Josiah Stamp subscribes the foreword to this little book and emphasises the present unfortunate position of the stockholders, for whom the book is mainly intended. The author, Mr. W. J. Stevens, needs no introduction as an authority on the financial side of railway enterprise, and in this small but replete volume he presents the position of the railways at a most opportune moment. In several important respects the situation of the companies has become clarified. Standard wages have been restored; the local rating problem has been settled till 1941; the agreed charges section of the 1921 Act has come into operation for the first time, and some tentative steps have been taken towards co-ordination of road and rail transport. The time was ripe for a review of the position, and Mr. Stevens has succeeded admirably in furnishing such a review. He recalls the origins of the 1921 Act, and traces the course of events that led to the legalisation of the concept "standard revenue." Past, present, and future conditions are all considered. Eleven of the 15 chapters are devoted to the relations of the companies with the State, the public, and the staff, with a chapter on "Co-ordination" and two on "Capital" and "Points for Investors." The four remaining chapters are devoted to descriptions of the positions of the four main-line companies, and there are also 11 appendices with the principal statistical data, including eight years' results of the four systems. Mr. Stevens recalls that at the time of the 1921 Act, and before the internal-combustion engine had created a revolution in transport, it was confidently expected by the author of the Act, Sir Eric Geddes, and others, that the future railway earnings would normally exceed the standard revenue. It was on this understanding that the railways entered into the bargain, and that that bargain has never been fulfilled is the keynote to the present position. Fortunately, the Railway Rates Tribunal, in its judgment last year, recognised this and laid it down that the realisation of the standard revenue was

regarded by the legislature as in the public interest. Mr. Stevens considers this pronouncement as of the greatest importance, and as one step towards what is, after all, the equitable recognition of the rights of the long-suffering stockholder. Another step is the co-ordination of road and rail transport, and as the author regards the competition between the two as the root of the failure of the railways to earn their standard revenue, he hopes the Government will recognise the urgency of the case. The interest of the public, of the employees, and even of the road hauliers, can, he considers, be reconciled, and this, under the shelter of wise legislation, should be the note for all in the future. The author's opening thesis, that "individual or group interests must be subservient to national welfare," seems to call for the qualification that national welfare means, in reality, the welfare of all the individuals comprising the nation.

Great Western Docks — 1938. — Great Western Railway, Chief Docks Manager's Office, Cardiff. Produced and published by H. N. Appleby by arrangement with the company. 11 in. × 8 in. × 1 in. 334 pp. and advertisements.—As might be expected in a publication dealing with a phase of its activities in which the Great Western Railway takes particular pride, this handsomely produced handbook well earns a place among the standard reference books for traders. The striking appearance of this publication has not been achieved at the expense of the purpose for which it is intended. It is informative as well as attractive. Each of the company's docks receives a separate description, setting out the nature of its trade and the facilities provided. In every case there are several full-page illustrations and a folding plan. There is little doubt that the docks of South Wales, coupled with the policy of the G.W.R. in keeping its facilities and equipment thoroughly up to date, have proved to be the greatest sustaining factor in the power of South Wales to resist the adverse effect of the general world depression in trade. As is pointed out in the foreword of this handbook, this has been largely due to the fact that the docks have facilities for dealing with all types of cargoes apart from the coal shipping business. It is encouraging to note that during 1937 these docks experienced a considerable increase in traffic; the aggregate tonnages of commodities dealt with were higher than they had been since 1931, the grand total being over 24 million tons up to November, 1937. The back pages of the publication are devoted to tables of trade statistics, dock accommodation, steamship services, dock rates, cranes rates, tide tables, and miscellaneous information. There are in addition a number of useful "trade articles" on important trades

and transport facilities. A general railway map is included.

A High-Speed Cutting Alloy.—Ardoloy, a high-speed cutting alloy made by the British Thomson-Houston Co. Ltd., and distributed by Alfred Herbert Limited, Coventry, is described in a catalogue we have received from the latter firm. This material is made in six grades, and all kinds of cutting tools are supplied with teeth ready tipped with the appropriate quality of Ardoloy. It is also supplied as separate tips for customers' tools; both forms are described, and the complete tools illustrated in line drawings, in this catalogue. Ardoloy will cut steel, cast iron, and non-ferrous metals at extremely high speeds, as well as materials hitherto regarded as unmachineable except by diamond tools. Its extreme hardness, in addition, makes Ardoloy a suitable material for steadies, micrometer contact-points, or any other purpose where resistance to wear is important.

Universal Relay.—Particulars of a new a.c. or d.c. relay for proving, control, repeating, and similar purposes in signalling circuits are given in an illustrated pamphlet which we have received from the Siemens and General Electric Railway Signal Co. Ltd., East Lane, Wembley. The relay movement is of the tractive armature type, housed in a sealed, dustproof bakelite case. The contacts are clearly visible through glazed windows in the front, back, and sides of the case. This instrument has been designed to meet economically the need of a small general purpose line relay where a maximum of 2F. and 2B. contacts are required.

Oil Switches and Circuit Breakers.—The revised edition (B.S.S. 116-1937) of the British Standard Specification for oil switches and circuit-breakers has been issued in two parts, the first covering three-phase oil circuit-breakers with breaking-capacity ratings up to 500 mVA., single-phase oil circuit-breakers, oil switches, and oil isolating switches; and the second part three-phase oil circuit-breakers with breaking-capacity ratings above 500 mVA. Part 1 conforms with the rules for the short-circuit conditions of the International Electro-Technical Commission specification for a.c. circuit-breakers. Part 2 conforms to the I.E.C. specification except in respect of actual values of recovery voltage, power-factor and d.c. component, the limits of which have been modified to provide standards suitable for large circuit-breakers. Each part of the new specification contains appendices dealing with service conditions, care and maintenance of oil circuit-breakers, selection of standard oil circuit-breakers, calculation of short-circuit currents, measurements of power-factor, recovery voltage, temperature, and short-time current, and an example of a report of a type test. Copies of this specification (B.S.S. 116-1937, Parts 1 and 2) may be obtained at 3s. 9d. each part, from the British Standards Institution, 28, Victoria Street, London, S.W.1.

THE SCRAP HEAP

ELEMENTARY, MY DEAR WATSON

The explanation that "perhaps they had had too much to drink" was put forward to account for the conduct of two travellers on the L.N.E.R., who, after a sojourn in the refreshment room at Cambridge, proceeded to wreck one first class compartment, damage another, and throw everything movable out of the window. They were each fined £21 and costs.

* * *

ODE TO A P.W. INSPECTOR

If you have a district all well kept and neat,
A joy to ride over, to look at a treat
No faults in alignment, not any low joints
No crossings that rattle and nicely oiled points
If your cesses are trim and the fences all sound,
The ballast well screened and no clay shows around
With the keys driven home the fastenings all tight
And any old rubbish put well out of sight.
If you keep it like this as months grow into years
Then you know your job, Sir! and need have no fears.

* * *

During the tunnelling operations on the Metropolitan Railway extensions in the summer of 1878, antiquarians had expected that the excavations would yield valuable finds of archaeological interest. Their hopes, however, were dispelled, for beyond a few fragments of Roman urns and a bronze coin or two, nothing of an archaeological value was unearthed. There was, however, a curious discovery made upon which no light has yet been thrown. This was an extensive deposit of bullocks' horns found underlying the surface of the ground at a depth of 20 ft. That they must have been there for a considerable time was indicated by the fact that the tips were black and rotten, but otherwise they were in fairly good condition. Several cartloads were excavated and sold. Curiously enough, during the progress of works in the neighbourhood of Westminster Abbey a similar mysterious deposit of deers' antlers was found, but no bones.

* * *

When the wind is right, the long shrill hoots of the locomotive whistle offer seven-league boots to the imagination. "Come a-wa-a-ay," says the whistle, "A-wa-a-ay." Then if you listen carefully, you may hear the engine whispering the names of the places to which he invites you—Kalamazoo, Kankakee, Medicine Hat, and all way stations. The whistle bridges all the miles between the Connecticut River and the Golden Gate with the quickness of a dream; you are on top of the Rocky Mountains, and a tiny train crawls by a mile below; the desert is hot and chromatic, and the locomotive howls like a banshee; Calgary is cold and snowbound as the engineer pulls the cord before the frozen crossing. And all the time you are lying in bed. At

night the railroad is the shuttle on a magic loom that darts back and forth through the web of memory, weaving a many-coloured pattern.—*From the Hartford "Courant."*

* * *

The intention of the L.N.E.R. to appoint this year a special staff of travelling cleaners to keep trains up "to drawing-room standard" and to introduce women for this purpose to give "the feminine touch" is, I believe, a complete innovation in this country. But it is not so everywhere. The announcement reminds me of a Continental journey some years back. I had been travelling on an international train across Belgium and Luxembourg for many weary hours and had been staying in the same carriage all the time from the Belgian port. As soon as we entered Germany and had hardly recovered from the Customs, passport, and money inquisition, a bouncing and business-like young woman entered our carriage with a big broom and duster and proceeded to sweep and clean the compartment with characteristic German thoroughness. I have heard that women carriage cleaners are employed on Russian trains, though I have never seen them clean compartments. So far as I remember their ministrations are chiefly concerned with tea and the Samovar.—*From A Business Man's Diary in the "Manchester Guardian" Commercial.*

* * *

PLACID AND PRAISEWORTHY
A Paddington official in a recent interview stated that from the railway company's point of view the elephant ranks high among the most satisfactory types of passenger. Naturally assuming that "elephant" is neither a reproachful term for he whose movements in a railway carriage are accomplished at the expense of his fellow travellers' corns nor yet a spontaneous epithet directed at those whose convex outlines mark them as well-living vulgarities in the minds of those leading a more proletarian existence—what, it may be asked, are the qualities that enable this elegantly upholstered beast to respect the Draconian laws of the railway in such supererogative manner as to win not only respect but Official Praise? The answer is that the elephant is content! Not only so but it always remains content, and, we are informed, it never even murmurs (not even an imprecation under its breath if it cannot find a corner seat facing



Striking notice issued by the Post Office with its quarterly telephone accounts

the engine). Perhaps the fact that the elephant never forgets also contributes towards the dizzy success as a passenger which has made it the railway company's darling. Having once travelled, it knows what to do on a second occasion. Never, when holding a third class ticket, does it seek, under the excuse that it is an anchorite, to rest its head on the snowy surface of the prohibited antimacassar! May the human passenger seek to win official favour by emulating the supernal nature of this worthy beast.

* * *

London Transport engineers have devised an anti-litter ticket punch for use on the underground railways. Instead of falling to the ground, ticket chippings are caught in a magazine, from which they may be emptied into a litter basket. This is a step in the board's campaign to encourage orderly disposal of litter on its properties. In a normal week 44 tons of litter are removed from trains and 20 tons from stations. The Hammersmith Borough Council has decided to erect baskets on all the board's bus and coach stop posts in the borough. At the request of the Council, notices asking people to use the baskets will be posted in London Transport road vehicles.

* * *

Mr. Reginald Gamble, a member of the staff of the Advertising Manager, L.N.E.R., who is the B.B.C. expert and regular broadcaster on beekeeping, on February 15, at 5.40 p.m., in the National programme, is to bring to the microphone in his series of discussion with beekeeping specialists, Mr. W. Herrod-Hempsall, F.R.E.S., the Technical Adviser in Beekeeping to the Ministry of Agriculture and Fisheries.

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

CANADA

Is Unification Inevitable?

Sir Edward Beatty, President of the Canadian Pacific Railway, speaking at a luncheon given by the Windsor Chamber of Commerce on December 8, said that unification of the two great Canadian railway systems was inevitable. The day would come, Sir Edward said, when there would be in Canada a Government with courage to accomplish the linking of the Canadian Pacific and the Canadian National Railways. The transportation problem was rapidly assuming such a serious aspect that the time could not long be deferred when it must be faced. Moreover, it was a problem which it would be easier to solve now than ten or twenty years hence. Transportation cost too much in Canada, Sir Edward went on to say, and it could be made cheaper. When the people realised what large sums they were paying in taxation to meet railway subsidies for what were, in reality, duplicate railway services, they would insist on the reform. It was an accepted fact that \$75,000,000 a year would be saved by unification. Better service would be given and all interests would stand to gain by the removal of useless and destructive competition. Sir Edward did not suggest that the C.P.R. should take over the National, with or without its debts, nor had his company made any pronouncement on this point. There should be a joint arrangement to operate the unified system for account of the two owners, and the Canadian Pacific did not expect to get anything out of it but the mutual advantage arising out of co-operation. The fusion would permit of the retrenchment of about 17 per cent. of staff, but this surplus would be taken up within five years by death and retirement. Sir Edward denied that a too-powerful monopoly would be created, and, on the contrary, he thought unification would assist the Board of Railway Commissioners, especially if the legislation brought before the last Parliament by Mr. Howe, Minister of Transport, with which he fully agreed, were approved. [This subject is also dealt with in an editorial on page 101.—Ed. R.G.]

INDIA

N.W.R. Exhibits at Lahore Exhibition

[In the news section of our issue of December 10 (page 1040) we published a brief note on the railway exhibits at the Lahore Exhibition. We have now received further details and one correction from a correspondent in India.—Ed., R.G.]

On December 6 the Lahore Exhibition was formally declared open by

H.E. Sir Herbert Emerson, Governor of the Punjab. As neither an "XC" or "XS" Pacific locomotive could be spared from traffic the 2-6-2 + 2-6-2 Garratt built by Bever Peacock & Co. Ltd. in 1925 for the North Western Railway was substituted as part of the railway exhibit. The Garratt was placed alongside the old 0-4-2 engine *Eagle* of the Scinde Punjab & Delhi Railway. Normally, this old engine stands on a plinth just inside the entrance to the locomotive workshops in Moghalpura. [On page 121 will be found illustrations of this old engine and the other exhibits.—Ed., R.G.] According to the makers' plate on the splashers the *Eagle* was built in Newcastle by Robert Stephenson & Company in 1869.

Instructive Details

Alongside the engines, there is an exhibit from the carriage works, consisting of a modern bogie chassis with sectionalised third and first class compartments mounted at each end. These compartments together with the brake gear and lighting set on the chassis have been cut away to show the stages in their construction. A gangway has been arranged so that visitors after mounting the cab of the *Eagle* pass on to the Garratt and then through the cut-away coach. The instruments in the cabs of the engines and the various parts of the coach—as the illustrations show—are well labelled in English and Urdu and they are certainly amongst the most explanatory exhibits at the show. Other outdoor exhibits include a modern inter and third class coach, the stages in the manufacture of a drawbar and hook, and an exhibit showing how a carriage wheel is made.

In the Hall of Science, the N.W.R. Bridge Department is exhibiting various small welded trusses, Fereday Palmer stress recorders and deflectometers (mounted on a shallow beam which can be easily deflected to show readings on the instruments), photographs of bridge works on the system, models of the Attock Bridge, showing the method used in the replacement of the 308-ft. spans in 1929, and the Ever-all interchangeable span adopted by the military authorities in India.

Works Programme for 1938-39

A meeting of the Standing Finance Committee for Railways was held at New Delhi on December 20 and 21. In view of the improvement of railway finances this year, the committee discussed the possibility of accelerated repayment to the depreciation fund of the loan taken from it in connection with the expenditure on repairs to earthquake damages and to the Harding bridge protection works.

The committee examined the programme of works of the various rail-

ways for the coming year and approved of the proposal of the Railway Board to allot a sum of Rs. 9½ crores (£7½ millions) in the budget for 1938-39 under "Capital and Open Line Works." Out of this sum, Rs. 6½ crores will be met from the Depreciation Fund and the balance will represent new capital. The rolling stock programme which was sanctioned by the committee in June last has now been finally approved at Rs. 406 lakhs, advance in prices being responsible for some increase on the original figure. A sum of Rs. 45 lakhs is to be provided for the construction of the Sind Right Bank Feeders railway. There are two other projects, viz., the Pithoro-Tando Mitha Khan, and the Khadro-Nawabshah, which are yet under examination. If these are found to be paying propositions a further sum of Rs. 11 lakhs may be spent on new construction next financial year.

The open line works, covering a wide range of activity, include the doubling of the main line between Chupra and Sonapore on the Bengal & North Western Railway. This scheme, which is estimated to cost over Rs. 27 lakhs, includes the raising of the formation between Sonapore and Dighwara and the provision of a large number of waterways in order to effect equalisation of the water level on each side of the railway during floods. As usual in previous years, the actual sum to be provided will be less than the estimated cost of the programme, as past experience has shown that the administrations generally find it difficult to spend the whole of the budget allotments during the year.

Mysore and M. & S.M. Railways

On January 1, 1938, the Railway Department of the Mysore Government will take over the management of the Bangalore-Harihar, and the Yesvantapur-Hindupur sections which have been worked by the Madras & Southern Mahratta Railway for the last thirty years. From the same date the working of Bangalore City railway station will devolve upon the Mysore Railways, though the broad gauge goods shed and the broad gauge permanent way will continue to remain under the M. & S.M. Railway. The Mysore Railways will thus rank among the Class I railways with minimum gross earnings of over Rs. 50 lakhs a year. It is understood that a vigorous attempt will be made to counter motorbus competition in the areas served by the lines that are being taken over. The reduction of third class fares will be one of the earliest measures contemplated in this connection.

NEW ZEALAND

Railway First Aid Work

The Government Railways first aid work and equipment although already extensive are to be extended. At present there are 350 railway stations equipped with ambulance stretchers,

and 750 with first-aid boxes. In addition all departmental workshops are so equipped. Wellington, Dunedin, and Frankton Junction stations have ambulance rooms, and every guard's van has its first-aid box. Members of the platform staffs are qualified in first-aid work and wear the St. John Ambulance badge. To encourage its own St. John Ambulance divisions the department gives the men leave on pay and rail passes to participate in annual competition with other divisions, and it pays the men's class fees and provides all their equipment. In the last eight years the Railway Department has spent £2,500 on fees and equipment and, since 1928, 1,500 employees have qualified as trained St. John Ambulance men.

HONG KONG

The Recent Typhoon

[The following further details regarding the great typhoon on September 2 last—briefly referred to in our issue of October 29—have now been received from Hong Kong.—Ed. R.G.]

The typhoon struck the city about 1.30 a.m. and continued with gradually decreasing violence and torrents of rain well into the day. A wind velocity of 164 m.p.h. was registered, and it is thought that 200 m.p.h. was reached by gusts on the Peak. The whole of the roof and chimneys of the house occupied by the Manager and Chief Engineer of the Kowloon-Canton Railway (British Section) were blown away. About 6,000 ft. of the main line were undermined by the tidal wave, estimated at 30 ft. in height.

Repairs to the Railway

Some 2,000 men were quickly put to work under the engineers, to repair the formation and track, with the result that by September 10, the first ballast train was able to pass over the damaged section, and the first passenger train followed the next day. Thus with 16,800 coolie-days and work going on night and day, 21 embankments, that had been washed away, were repaired. The largest individual banks were 25 ft. high and pitched with granite blocks set in cement mortar; these had been completely demolished. It will be seen, therefore, that excellent work was done in the rapid restoration of the line and of a full service of trains by September 13.

ARGENTINA

South American Locomotive Engineers' Dinner

The annual dinner of the South American Centre of the Institution of Locomotive Engineers was held on November 5 at the Argentine Yacht Club, Buenos Aires. The Chairman of the centre, Mr. Frank Campbell, presided, and the guests of the evening were Messrs. C. E. S. Dodd, Counsellor to the British Embassy; S. G. Irving, C.M.G., Commercial Counsellor; Engi-

neer Antonio Vaquer, President of the Argentine Centre of Engineers; and Mr. R. Flack, Chief Accountant, Central Argentine Railway. After the loyal toasts had been proposed by the Chairman and honoured, Mr. Irving proposed that of "The Institution." The toast of "The Guests" was proposed by Major R. K. Hubbard, O.B.E., Assistant to the General Manager, Central Argentine Railway, who mentioned that, on British railways in Argentina, locomotive engineers were responsible for the design, specification and selection of railway assets representing a capital value of some £60,000,000, including locomotives, coaches, wagons, plant and machinery, but exclusive of the land and buildings required to house them. Mr. Flack responded. (See illustration on page 124.)

URUGUAY

Importation of Motor Vehicles Prohibited

A Decree issued by the Uruguayan Government on November 9 prohibited the importation, until further notice, of motorcars, omnibuses, or their chassis, bodies or engines. The reason for this step given in the Decree is that the importation of motor vehicles into Uruguay during the past few months has been far in excess of the country's requirements, and during the last two years all necessary renewals of mechanical vehicles have been made, with a substantial surplus.

CEYLON

Retrenchment Report

Retrenchment measures on the Government Railway, calculated to effect an annual saving of Rs. 1,926,994, are proposed in a report shortly to be placed before the State Council by the Executive Committee of Communications and Works. The present position of the railway is stated to be considerably more serious than it was at the time the recommendations of the Hammond Commission were received, owing to a rise in the contract price of coal and of railway sleepers, and because there was reason to believe that even some of the important patrons of the railway were making plans to transport goods by road.

"Support the Railway" Appeal

Mr. L. T. Stott, Deputy General Manager (Commercial), in the course of an address at a meeting of the Uva Planters' Association, said that the railway extensions from Bandarawela to Badulla were constructed at the extremely heavy cost of Rs. 9,762,683 owing to the difficult nature of the country, and had consistently shown a loss on working, thus indicating that from a commercial point of view the construction of the section beyond Bandarawela had not been justified. On inquiry he found that out of 88

planting estates in the district no fewer than 52 were employing direct road transport to Colombo to the detriment of the railway. Mr. Stott said that his mission was to appeal to the planters to support the railway as far as it was in their power to do so. He pointed out that the major portion of the loss to railway revenue was due to traffic captured by road competition throughout the island, and that the section of railway hit hardest was that between Haputale and Badulla, which also showed the most continuous decline in receipts.

He went on to say that he thought it must be admitted, even by those prejudiced in favour of road transport, that under present conditions the competition between road and rail was far from fair. Every move made by the railway to introduce lower rates and fares was immediately counteracted by their competitors, who in many cases quoted ridiculous rates in order to secure traffic. He therefore earnestly appealed to all to do everything within their power to give the railway the fullest possible support.

After some discussion the meeting passed the following resolution: "That this association is strongly of opinion that the only hope of restoring the railway to economical stability is by the enforcement of proper road control by the immediate formation of a transport board with wide powers, as the Transport Commission recommended."

GERMANY

The Rheingold Express

From May 15 next the schedule of the Rheingold Express, the well-known luxury train of the Mitropa Company running between the Hook of Holland, Amsterdam, and Basle, is to be greatly accelerated. As a result the journey from the Hook of Holland to Basle will be shortened by 76 min. and from Amsterdam to Basle by exactly one hour, while the cuts in time in the northbound direction between the same cities will be 71 and 55 min. respectively. Further, the arrival in Basle an hour earlier than hitherto, and the departure from Basle for Holland no less than 3 hr. later, will greatly widen the radius of action of this popular express. Whereas it has not been possible to travel further in the one day (finishing the journey at a reasonable hour) than to Lucerne and Zurich southbound, and from the same cities northbound, in connection with the Rheingold, it will then be possible to get as far afield as Chur and Lugano well before midnight, and similarly to travel from Lugano, Chur, and all parts of the Bernese Oberland—hitherto the only possible connection from Interlaken has left in the small hours—to connect with the Rheingold at Basle.

Southbound the Rheingold is to leave Hook of Holland at 7.2 instead of 6.58 a.m., and Amsterdam at 7.40 instead of 7.52 a.m.; by a cut in the

Emmerich frontier stop from 20 to 1 min., and some acceleration in both Holland and Germany, Cologne will be reached at 11.5 a.m. instead of 12 noon. Further acceleration will bring the train into the Swiss station at Basle at 5.7 instead of 6.9 p.m., Zurich being reached at 6.33 instead of 8 p.m., Chur at 8.34 instead of 11.25 p.m., Lucerne at 6.50 instead of 8.22 p.m., Lugano at 10.29 p.m., and Milan at 12.8 midnight. In the reverse direction the connections will leave Chur at 7.43 a.m., Zurich at 10.2 instead of 7.22 a.m., Lugano at 7.43 a.m., Lucerne at 10.37 instead of 7.15 a.m., Interlaken at 8.30 a.m., and Berne at 10.8 instead of 7 a.m.; the Rheingold will depart from Basle at 12.21 p.m. instead of 9.18 a.m., and from Cologne at 6.30 instead of 4.9 p.m., reaching Amsterdam at 10.51 instead of 8.43 p.m., and Hook of Holland at 11.34 instead of 9.42 p.m. Evidently some acceleration of the L.N.E.R. steamer service to Parkeston Quay is also planned, as the arrival at Liverpool Street is still to be 8.38 a.m. as hitherto. The Harwich-Hook of Holland-Rheingold service will thus give comfortable communication to and from all parts of Switzerland by a fine scenic route, and its popularity is likely to be considerably increased in consequence. In German territory the acceleration in running is 36 min. southbound and 34 min. northbound; the fastest point-to-point runs will be over the 63.9 miles between Baden-Baden and Freiburg-in-Breisgau, to be covered in 59 min. southbound and 58 min. northbound. Most of the station stops are also pared to contribute to this notable acceleration.

DENMARK

New Lightweight Welded Stock

The new all-steel passenger coaches ordered some time ago by the State Railways are now in course of delivery. Two types are being supplied, namely first class and composite. The composites are intended primarily for use as through coaches between Copenhagen and Jutland on the principal steam-hauled expresses, and the others will replace old stock which will then be rejuvenated and put into service again as general class coaches; the ultimate consequence will be the scrapping of some of the oldest four-wheeled stock, which still has to be pressed into service on special occasions. The new coaches are all-welded, and the tare weight of each is about 35 tons, which is about 8 tons lighter than the older type of steel stock and about the same as that of the ordinary wooden coaches with steel underframes.

Important New Works

The State Railways are undertaking two works of considerable magnitude in connection with the Unemployment Relief Act. The first is the doubling of the line between Randers and Aalborg, on the East

Jutland main line, a distance of 50 miles. The estimated cost is Kr. 15 million (about £650,000), of which about Kr. 5.8 million, for earthworks and bridges, are covered by the Act, the trackwork being carried out by the State Railways under their normal yearly grants.

The second work is the construction of a set of flying junctions west of Roskilde, on the Copenhagen-Korsør main line. At Roskilde two secondary main lines diverge from the main line, one to each side, resulting in a number of conflicting movements over the station tracks. The station has recently been entirely remodelled, and the new layout has been so designed that the introduction of flying junctions to the west of the station could take place with practically no alterations in the station tracks. The estimated cost is Kr. 2.4 million, of which 1.5 millions will be covered by the Act. Details are not yet available.

Major Works Programme

Other works which the State Railways propose to undertake in the course of the next few years include the following:—

(a) Subsoil examination and observations of current and shipping traffic conditions in the Great Belt as a preliminary to possible serious consideration of several proposals for a bridge across this channel. These investigations are to be completed by 1941, but they do not necessarily foreshadow a definite decision to build a bridge.

(b) A fourth big diesel ferry for the Great Belt crossing, as the capacity of the existing vessels is already severely taxed at times.

(c) Elimination of several level crossings between the Copenhagen-Korsør main line and the main road between the same two points. There have been a number of serious accidents at these crossings in late years, but the works involved are very extensive, in fact one proposal to do away with two of these danger spots involves the construction of no fewer than 4½ miles of new double track and a new station at Fjenneslev, with corresponding abandonment of the present alignment.

(d) Doubling of the track between Vejen and Bramminge (17 miles), on the Fredericia-Esbjerg main line. This is the last remaining section of single track between Copenhagen and Esbjerg. The earthworks have already been completed.

(e) Conversion of the Padborg-Tinglev section from double to single track. This section of the Flensburg-Fredericia main line was doubled before 1920, being consequently built to the German loading gauge, which is considerably narrower than that of the Danish State Railways. Apart from this, traffic is not dense enough to warrant double-track working south of Lunderskov (the junction with the Fredericia-Esbjerg line).

Copenhagen Boulevard Tunnels Laid with 60-m. Rails

All four tracks in the Boulevard tunnels in Copenhagen are now laid with continuously welded rails, two of the tracks having been recently relaid, and about half a mile of double track

at the one end of the tunnel has recently been relaid with 60 metre (200 ft.) rails, consisting of four 15-m. rails welded together. The track on the Storstrom bridge approach spans is laid with 120-m. (400-ft.) welded rails with point-type expansion joints.

SPAIN

Improved Frontier Communications

According to a telegram from Salamanca, refugees from Catalonia state that a third rail has been laid into the French station of Latour de Carol from Puigcerda, which enables trains on the Spanish gauge to be loaded in France and thus avoids the risk of aerial bombardment at Puigcerda. But the railway services in Republican Spain are in a deplorable condition. Owing to lack of coal, only one train runs daily to the frontier, although recently the Government bought 5,000 tons of fuel for the heating system of the Ministries.

SWITZERLAND

Canvassing Goods Traffics

The Federal Railways are organising, as a subdivision of their Commercial Section, a special service for propaganda in connection with goods traffic. Activities in this direction have hitherto been left to the "Sesa" (the road distributing organisation with which the railways co-operate), but in future more intensive and systematic canvassing, including regular visits to customers, will be undertaken by the new office with a view to maintaining close contact with business firms.

Railcars for Winter Sports

The Federal Railways' Red Arrow electric railcars are again being used for winter sports traffic this season, their high speed enabling them to convey parties from Central Switzerland, for instance, to Landquart or Chur—connecting at these points with the metre gauge private lines—for a full day's skiing in the famous Parsenn district or at Arosa. This winter's novelties are the running of a Federal railcar excursion through to St. Anton, in the Austrian Tyrol, and the provision of two-wheeled trailers, weighing only 1.44 tonnes and carrying some 80 skis, for use with such excursions.

Level Crossing Elimination

According to the Federal Railways Bulletin the elimination of level crossings is now frequently connected with the relief of unemployment, thus involving financial participation of the Swiss Confederation and the cantons concerned. From 1924 to 1936, 128 underline or overline bridges were built to replace level crossings, at a total cost of nearly fr. 45 million. The average frequency of level crossings on the Federal Railways was 620 m. in 1930 and 660 m. in 1937.

NEW LOCOMOTIVES FOR INDIA

Two G.S.M. class engines built to maximum capacity within the limits of a 17-ton coupled axle-load

AN order for two 4-6-0 type passenger locomotives has recently been completed by Robert Stephenson & Hawthorns Limited, at the firm's Darlington works. The engines have been designed and built to the requirements of the Bengal-Nagpur Railway administration under the supervision of Sir John Wolfe Barry & Partners, consulting engineers to the company.

These locomotives, classified as the G.S.M. class, represent a further development of the G.S. class 4-6-0 type mail engines, and whilst incorporating certain details and fittings of their predecessors, are of a new design, the basis of which is the attainment of maximum boiler and engine capacity on the 4-6-0 wheel arrangement and within the limits of a 17-ton coupled axle-load. The boiler barrel is built up of 2 per cent. nickel-steel plates with a copper interior firebox. It is fitted with a mechanical cleaner and brick arch supported upon circular tubes, also two soot blowers, one on each side of the firebox. The superheater has 25 elements, with two air valves outside the smokebox; and the firedoor is steam-operated. The boiler feed is delivered to the top of the barrel by live and exhaust steam injectors, one on each side of the engine. The firegrates are of the steam- and hand-operated rocking type, with wide air spaces to suit the fuel used, and a drop grate is provided at the front. The hopper type ashpan is designed to give ample capacity without infringing the air supply to the grate.

In view of the reference made above to boiler capacity, some further comment may be of use to our readers. Using the Baldwin formula as the basis of calculation, the potential boiler horsepower of this boiler represents an increase of approximately 29 per cent. compared with that of the original 4-6-0 type passenger engine, and as a further means of expressing the effectiveness of the design, the following are interesting ratios:—

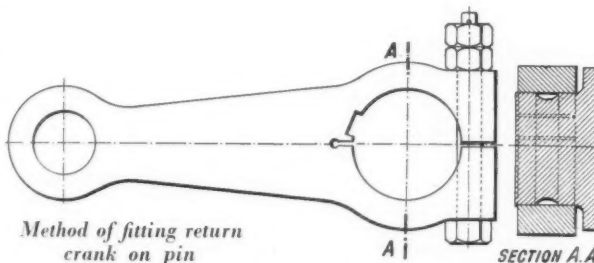
Area of superheater elements	=	1.078*		
Main steam pipes				
Heating surface evaporation	=	42.2	Grate area	= 6.78
Grate area			Flue area	
Heating surface firebox	=	5.3	Tractive effort	= 731
Grate area			Grate area	
Heating surface superheated	=	Long tubes, 25 per cent.; short		
Heating surface evaporative	=	tubes, 19.8 per cent.		
Heating surface firebox	=	0.994		
Firebox volume				
Tractive effort per ton weight	=	370 lb.		
of engine in working order				
Percentage of total weight of				
engine available for adhesion	=	67.8 per cent.		
at 1:4				

The cylinders are placed outside the frames, and bolted to them with a box steel casting between them, above which runs a horizontal frame stretcher; this stretcher, beginning at the buffer beam, is carried back to form a continuous system of horizontal staving, comprising the cylinders and driving axle, the horizontal stay plates being suitably lightened to give elasticity to the frames and also provide accessibility between them. The intermediate drawgear is of the Goodall articulated type with wedge attachment to the engine and tender dragboxes. The engine and tender can therefore be uncoupled by with-

drawal of the wedges either on the engine or tender. All adjustments to the drawgear spherical wearing surfaces are independent of the attachments, and they can therefore be made at the bench, after which the complete drawgear is returned to the dragboxes, and the wedges dropped and firmly clamped in position. The leading bogie is of the sliding type, and both the engine and tender bogie centre liners are made of Salvabestos, which, it is claimed, requires no lubrication. The cylinder and valve packing rings are narrow, and the pistons are of cast steel with a gunmetal bull ring attached. The piston valves, 12 in. dia., are of the Pennsylvania type with hollow trunk, and the valve gear is designed to give efficient admission rates from 80 per cent. to 15 per cent., the maximum valve travel being $8\frac{1}{4}$ in. The working parts of the gear are bushed with phosphor bronze bushes.

The connecting and coupling rods are of steel, Class C, with a floating bush at the big end and fixed bushes for the rest. The connecting and coupling rods, bogie slides, and Goodall drawgear, are grease lubricated by the Tecalemit system. The solid bronze coupled axleboxes are oil lubricated by gravity feed through continuous sealed pipes from external oilboxes, in conjunction with Armstrong oilers in the keeps. The valve gear is also oil lubricated, by means of oilcups and syphons. The cylinders and valves are lubricated by means of a sight feed lubricator. In this design, regard has been paid to accessibility of all motion parts, cylinders, &c.

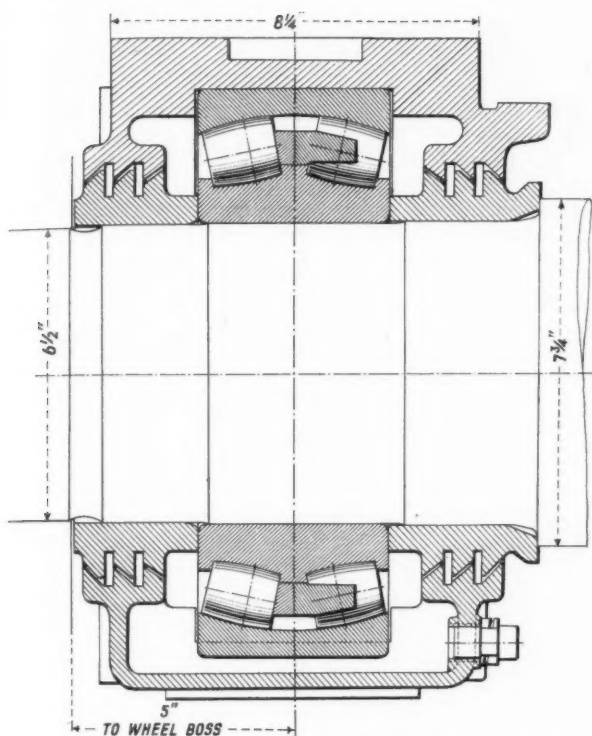
The drawing reproduced below shows the fitting of the return crank to the crank-pin driving the Walschaerts gear. It has been found when renewing square-ended



crankpins that great difficulty is experienced in directly locating the position of the crank on the crankpin. The design adopted obviates difficulties of this sort.

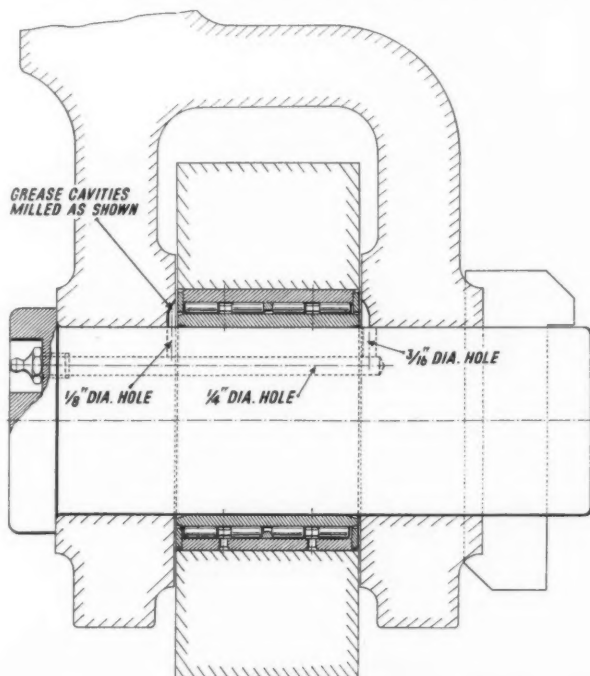
The fittings in the cab are conveniently arranged, and carrying the firing tools in a container on the left-hand side of the engine enables them to be inserted or withdrawn from the container or firehole respectively, without the inconvenience of turning them round as is the case when they are carried in a container on the tender. The axleboxes of the engine bogie and tender, are equipped with SKF roller bearings, each axlebox having a unit incorporating one self-aligning roller bearing arranged for grease lubrication. In 1934, one of the 4-6-2 "M" class engines of the Bengal-Nagpur Railway was fitted experimentally with a roller bearing bogie, having boxes of a design similar to that now used. The improved riding of the engine due to reduction in side-play was pronounced, and it is as a consequence of this that the new engines now illustrated are being equipped with the same arrangement. There is one improvement in design relating to the spherical sealing labyrinths which work in conjunction

* Trials in India have shown that ample area through superheater elements is a cardinal factor in reducing the drop of steam pressure in the steamchests. Many engines suffer in this respect with ratios as low as 0.72.—Ed., R.G.



Roller bearing axlebox used for the engine leading bogie

with the roller bearings, and which ensure accurate alignment of the box guides with the frame cheeks. Liners of 11 to 14 per cent. manganese steel are fitted to the guide faces, with the object of minimising wear. The tender axleboxes are of the usual SKF design incorporating two self-aligning roller bearings, and here also, 11



Roller bushings used for the compensating beams of the coupled wheel springs

to 14 per cent. manganese liners and grease lubrication are used.

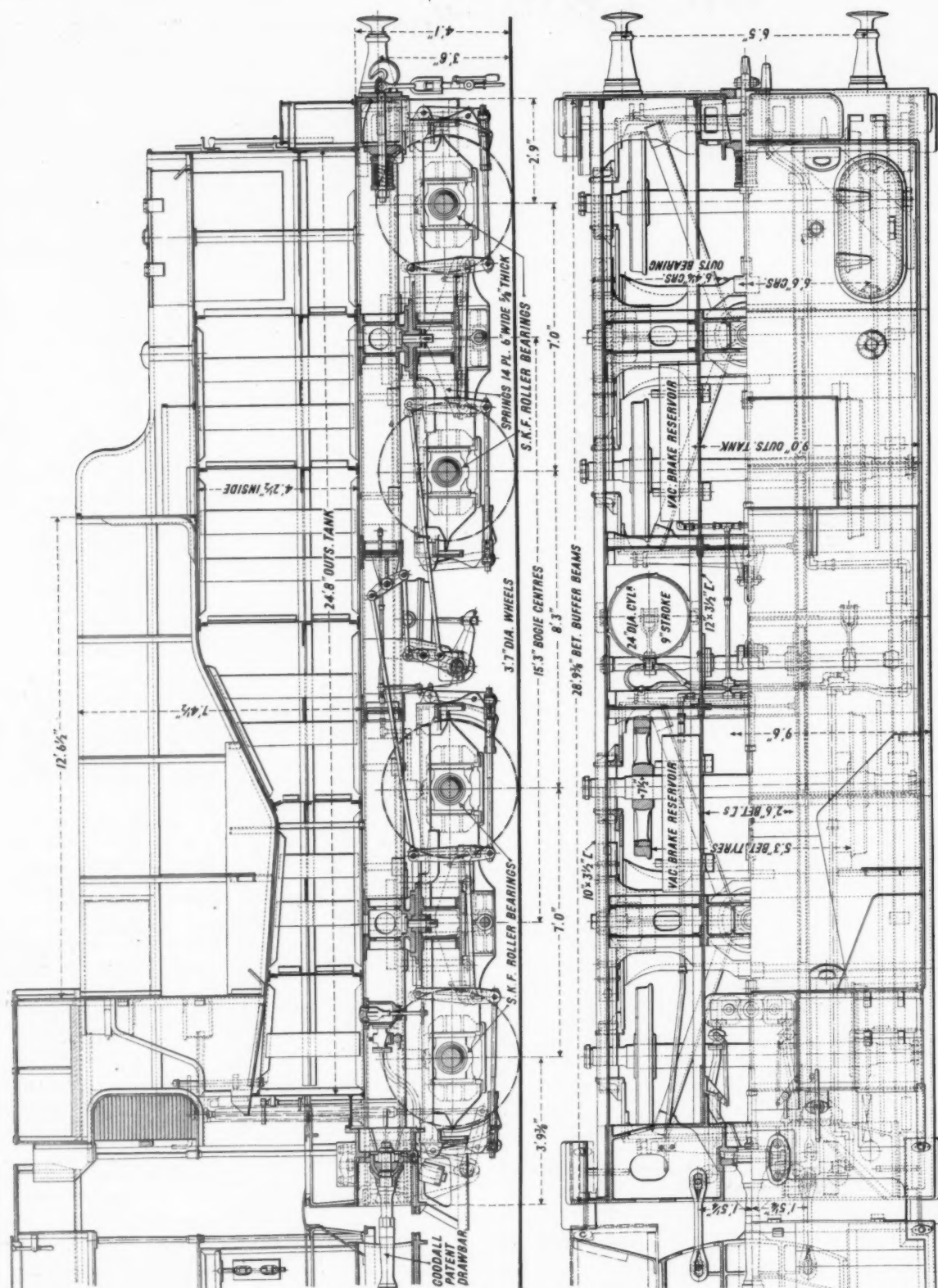
A further anti-friction bearing application on the engines is that of the SKF roller bushings used on the coupled wheel spring compensating beams. This comprises inner and outer sleeves of roller bearing steel in which two rows of rollers are incorporated. These are necked in the centre to permit of the introduction of a spring clip, which is retained in position during assembly, and prevents the rollers coming adrift in dismantling. Similar applications tried out on "M" class engines on the Bengal-Nagpur Railway gave a mileage of approximately 33,000, with very little wear. It is hoped that this will solve the excessive wear problems now experienced on these pins in India, and improve the efficiency of the spring suspension.

The principal dimensions of the locomotives are:—

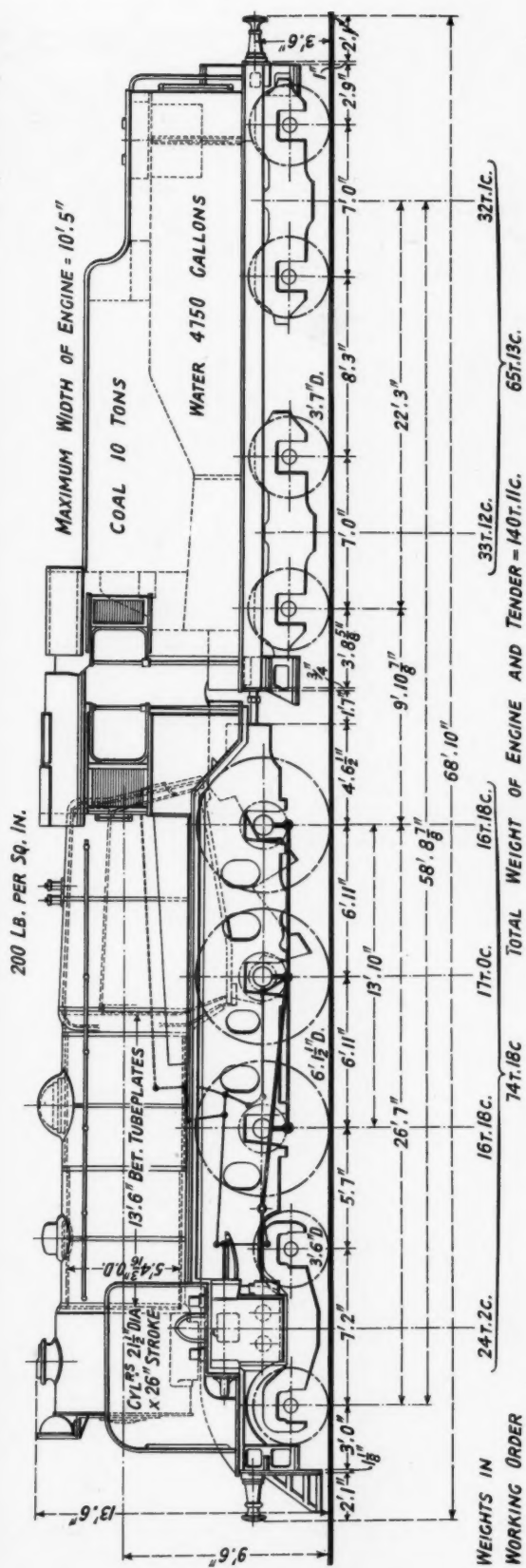
Cylinders, dia.	21 1/2 in.
Piston stroke	26 in.
Wheels, coupled, dia.	6 ft. 1 1/2 in.
Wheels, bogie, dia.	3 ft. 6 in.
Wheelbase, coupled	13 ft. 10 in.
" total engine	26 ft. 7 in.
Boiler, heating surface:	
Small tubes (133-2 in. dia. outs.)	937.2 sq. ft.
Large tubes (25-5 1/4 in. dia. outs.)	461.2 "
Firebox and arch tubes	201.6 "
Total (evaporative)	1,600 "
Superheater	317 "
Combined heating surfaces	1,917 "
Grate area	38.0 "
Boiler pressure	200 lb. per sq. in.
Adhesive weight	50.8 tons
Weight in working order, engine	74 tons 18 cwt.
" " " tender	65 tons 13 cwt.
" " " total engine and tender	140 tons 11 cwt.
Tender: Water capacity	4,750 gal.
" Coal capacity	10 tons
Traction force at 85 per cent. of the boiler pressure	27,787 lb.

The tender is carried upon two four-wheeled bogies, and the tank is of partly welded and partly riveted construction. The two locomotives were shipped to India in the early part of December. The following is a list of sub-contractors:—

Ajax firedoor	Whitelegg & Rogers Limited.
Superheater	Superheater Co. Ltd.
Joco regulator	Wota Limited.
Live steam injector type S.A. No. 12 S/10 on right-hand side	Gresham & Craven Limited.
Exhaust steam injector No. 10 on left hand side	Davies & Metcalfe Limited.
Hopkinsons parallel slide blow-off cocks	Hopkinsons Limited.
Clyde soot blower	Clyde Blower Co. Ltd.
Hulburds' mechanical cleaner	Hulburds' Patents Limited
Wakefields' Eureka type "D" sight feed lubricator	C. C. Wakefield & Co. Ltd.
Vacuum brake	Vacuum Brake Co. Ltd.
Ross pop safety valves	R. L. Ross & Co. Ltd.
Glass gauges	Dewrance & Co. Ltd.
Alfol lagging	Alfol Insulation Co. Ltd.
United Kingdom metallic packing	Railway Signal Co. Ltd.
Woodhead's divided back-plate springs	Jonas Woodhead & Son Ltd.
Compound rubber bearing springs	Geo. Spencer Moulton & Co. Ltd.
Lambert sanding apparatus	Freins Jourdain Monneret.
Goodall drawgear	A.B.C. Coupler & Engineering Co. Ltd.
Engine and tender bogie axle-boxes	Skefko Ball-Bearing Co. Ltd.
Electric lighting	J. Stone & Co. Ltd.
Feeny's improved patent cast steel turtle back ramps	Thos. Firth & John Brown Ltd
Pyrometers	Foster Instrument Company.
Speed indicator and recorder	Hasler Telegraph Works.
Grease, guns and nipples	Tecalemit, Ltd.
Armstrong oilers	Armstrong Oiler Co. Ltd.
Salvabestos bogie centre liners	Turner Bros. Asbestos Co. Ltd.



DETAILS OF BOGIE TENDER FITTED TO NEW 4-6-0 TYPE EXPRESS LOCOMOTIVE, BENGAL-NAGPUR RAILWAY



NEW G.S.M. CLASS 4-6-0 TYPE EXPRESS LOCOMOTIVE, BENGAL-NAGPUR RAILWAY. GENERAL VIEW AND DIMENSIONED DRAWING

THE NEW RIVER JERTE BRIDGE

Due to the civil war the Seville-Salamanca line has become a main Nationalist artery necessitating the rapid replacement of a collapsed arch over this river

AS a result of the civil war the Seville—Merida—Caceres—Salamanca line became converted into a main artery of the communications of Nationalist Spain, and the track had hurriedly to be reconditioned to allow of heavier traffic and higher speeds. One of the

principal obstacles to increased efficiency of operation was the bridge over the river Jerte, a northern tributary of the Tagus, between Plasencia and Oliva. The original iron bridge was not designed for modern loads, and for several years trains were divided at Plasencia and hauled



Left: Train hauled by 4-8-0 locomotive crossing the new bridge constructed in the record time of 4½ months. The main span consists of 170-ft. twin arches



Right: Main span under construction showing the twin arch design and reinforcement of the pillars for carrying the floor

over the bridge in sections by lighter engines. In 1931 work was begun on a new bridge of reinforced concrete, consisting of a central arch of 52-m. span, and several 10-m. approach spans. In 1933, however, when the work was nearing completion, the central arch collapsed. A commission of enquiry was appointed but at the time of the outbreak of the war nothing had been done. The National Western Railway Company, to whom the line belongs, was obliged to take the matter up in view of the delays to traffic and a survey was made in 1936.

A second reconstruction was begun on June 10, 1937, and scheduled to be completed within six months, but so rapidly was the work pushed forward that it was finished

by October 24. The new bridge has a central span consisting of reinforced concrete twin parabolic 52-m. arches with a headway of 42 m. above the river bed, and the floor of the bridge is carried on pillars resting on each arch. An interesting feature of the new bridge is the reduction in the volume of the central span from 1,000 cu. m., as provided in the former plan, to only 250 cu. m. Rails were used in the construction of the central arch, in place of the usual bar reinforcement which was unobtainable in Spain owing to the war. The bridge was opened on November 18, since when it has been in continuous use carrying the heaviest engines and trains.

ROLLER BEARING WAGONS FOR CENTRAL RAILWAY OF BRAZIL

A batch of 200 all-steel wagons having axleboxes formed integrally with the bogies and housing roller bearings

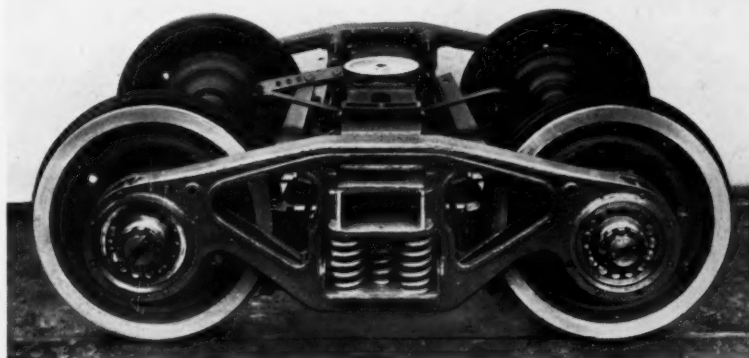


WE illustrate one of 200 50-tonne mineral wagons supplied by the Ateliers de Construction de Familleureux for service on 5-ft. 3-in. gauge sections of the Central Railway of Brazil. This stock is mounted on Integral type cast steel bogies with S.K.F. roller bearing axleboxes. The bodies, of all-steel construction, have side doors controlled by levers at each end of the wagon. Atlas automatic couplers and Westinghouse brake are fitted.

The wagons measure 29 ft. 6 in. over-all, and the bodies have a width inside of 7 ft. 0½ in. The bogies are 17 ft. 8½ in. centre to centre, each with a wheelbase of 5 ft. 11 in. The axleboxes are in one piece with the bogie side members, as is shown in the illustration of one of the bogies with axle-box covers removed, and are designed to house S.K.F. No. 22332 roller bearings.

The chassis of the vehicles is built up upon a very strong central girder consisting of two 12 in. × 3½ in. × ⅝ in. channel sections. The end sills are of the same channel section; and the side members, supporting the floor, are 4½ in. × 3½ in. × ⅝ in. angles, riveted to the cross-pieces of the frame.

The floor of the wagons is of ¼ in. and the sides of ¼ in. sheet steel. The latter are reinforced top and bottom by 2 ⅝ in. × 2 ⅝ in. × ⅝ in., and 3 ⅝ in. × 2 ⅝ in. × ⅝ in. angles respectively, and each is supported by four strong pillars in addition to the angles pieces at the ends. Five doors are provided at each side of the wagons.



Bogie with axlebox covers removed, showing location of roller bearings in housings incorporated in the side members

EAST INDIAN RAILWAY EXPERIMENTAL DERAILMENTS

(From our Indian correspondent)



Experimental derailment of complete train consisting of 0-6-0 engine and bogie stock with steel underframes and wooden bodies

THE East Indian Railway authorities have spared no pains to discover the cause of the disastrous derailment that overtook the down Punjab express near Bihta in July last. Important experiments were carried out in September near Jamalpur on a track specially prepared to reproduce as nearly as possible the exact running condition which the ill-fated train had experienced at the time of the accident. Immediately after the accident, railway experts had carefully examined the condition of the track, the nature of abrasions on rails and the marks left on the wheels and other exposed parts of the rolling stock.

In order to obtain additional data for a detailed study of these observations, four derailments of a locomotive of the "XB" class, similar to that in the original derailment, were staged on the special track at varying speeds. The derailments were effected by the loosening of the fish-plates and the deflection of the inner and outer rails in

different directions. After each derailment the marks produced on the rails, the locomotive wheels, brake hangers and others parts were carefully recorded. Observations were also made of the condition of the track ahead of the point of derailment. On the conclusion of each experiment, the track was prepared afresh for the next trial. The locomotive used was one that had completed the usual mileage it had to run before a thorough overhaul in heavy repair shops. Thus, any damage it might have sustained in the course of the experiments will not cost much to repair. Actually, the four derailments did little harm to the engine, though the rails and sleepers were far less fortunate.

The final experiment—the derailment of a complete train—was one that had never before been undertaken in India. The news that something spectacular was about to take place got abroad and large crowds gathered to witness this intentional derailment. An old 0-6-0



Another view of the derailment showing the twisted and bent steel underframes and bodies reduced to matchwood



The wreckage after the derailment with little woodwork intact. The sandbags in the foreground were used to represent passengers in the coaches

type goods engine and ten coaches, all of which had outlived their normal period of usefulness and were due to be scrapped, made up the train. As before, the track was prepared to resemble the railway line at Bihta. Sand ballast in the coaches took the place of passengers.

As the derailment was to take place at a speed of 45-50 m.p.h., arrangements had to be made to arrest the progress of the train beyond the point of derailment. For this purpose, the engineering staff erected across the track a huge buffer consisting of about 600 tons of earth palisaded by stout wooden sleepers with an additional reinforcement of a facing of rails. The structure was further strengthened by a wall of sandbags. The derailment was effected by "pinching."

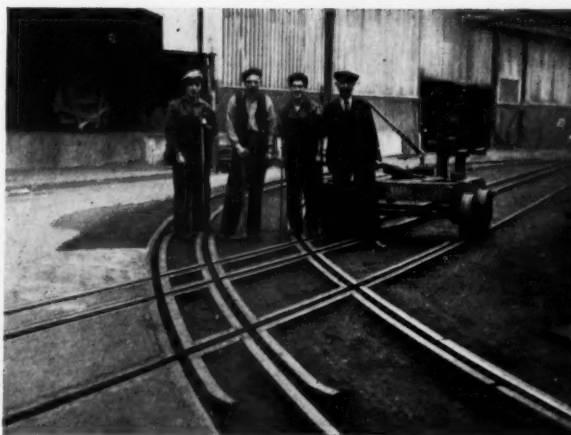
Starting from a point about five or six miles away, the train was pushed from behind by a second locomotive uncoupled from it, which detached itself when the train had attained sufficient speed to run down the falling grade at increasing speed. Plunging on after passing the deflected

rail, the train crashed with great force and a tremendous noise into the buffer, which was partly demolished. The engine which had leapt over what was left of it, had, strange to say, sustained little damage, but the four leading coaches were smashed to matchwood. The first appeared to be crushed longitudinally; the roof of the second carriage seemed to have been slit through; the third was flung up into the air where it seemed to have burst like a rocket before toppling over the fourth, which likewise followed to destruction. The fifth and sixth coaches were derailed, but sustained little damage. The rest of the train had not even left the rails. The whole experiment was cinematographically recorded.

After the derailment, the experts proceeded to make careful observations of the various markings on the rails and rolling stock. All these records, together with the film version of the mock disaster, were placed before the judicial inquiry which has been held at Allahabad by Sir John Thom, Chief Justice of the Allahabad High Court.

A Welded Railway Crossing

THE accompanying illustration shows an interesting welded four-way crossing installed in the Wallsend Shipyard of Swan, Hunter & Wigham Richardson Limited. The total weight of the crossing, which is for standard 4 ft. 8½ in. and metre gauge tracks, is about four tons, and it is built up from 80 lb. per yd. f.b. rail. It was installed as a result of the trial of a welded crossing laid three years ago, and as this proved highly satisfactory and cost virtually nothing for upkeep whilst maintaining perfect gauge and alignment, the new installation was decided. The rails are continuous on the straight road with the head removed at the crossings. The flanges of the rails are welded only in the vicinity of the crossings and where angle pieces are welded to the running rails. The check rails were subsequently added, having had ½ in. planed off the foot in order to give a 2¼-in. flange-gap for the wheels. Distance pieces ¾-in. thick and 2½-in. deep were welded at intervals between the webs of the running rails and check rails. The whole of the welding was done with Quasi Arc No. 8 Uranium electrodes.



HEAVY MOBILE RAILWAY CRANES

*Supplied by the firm of Ardetwerke,
Eberswalde, to the German State Railway*

IN common with other railway undertakings, the German State Railway possesses a number of travelling breakdown cranes, and some of these are of the latest and most powerful types. Those illustrated herewith were designed and manufactured by the firm of Ardetwerke, Eberswalde, near Berlin. Two of the cranes are shown in one illustration, lifting Mitropa and other vehicles after a railway accident; each is a 60-ton self-propelling crane which can deal with its maximum load at a radius of 24 ft. 6 in., and there is an auxiliary hoist capable of lifting 15 tons at a radius of 46 ft. Two of these cranes have been supplied, one driven by a steam engine, and the other by an internal-combustion engine.

In the construction of these cranes, it was necessary that all component parts should be accommodated within the dimensions of the standard loading gauge, whilst the supporting truck or bogie had to stand heavy shocks during shunting. Moreover, as the total weight had to be kept comparatively low, it was necessary to use high grade materials throughout, not only for the structural steel portions, but also for the steel castings and forgings. The crane consists of a lower framework, spring-suspended from six axles; and a revolvable superstructure.

The annular crane bearing rests upon a frame composed of two longitudinal and four transverse members, provided at the ends with hinged auxiliary supports. During transit and also when handling smaller loads of up to 10 tons at a radius of 24 ft. 6 in., these supports are

folded against the sides of the truck; but when heavy loads are being handled, the supports are swung out at right-angles to the permanent way, and are connected to the longitudinal members by means of bracings, in which positions they virtually form continuations of the cross frame members, and can be supported at the extremities, as well as at the hinged joints, by means of jacks provided at these points.

The six independent axles of the supporting truck or bogie are designed to negotiate 260 ft. radius. Hand-brake mechanism acts upon the two central wheel sets, and is arranged so that it can be operated from either side. The transmission for moving the crane drives the second and fifth axles, from a shaft passing through the pivotal column; a hand-crank is also provided to permit the crane being moved to the exact location desired. In view of the large maximum load of 60 tons, and the fact that no more than 18 tons should rest upon any single axle, the counterweight is designed to be moved lengthwise along the superstructure. When the crane works at maximum load, the weight is run out to the greatest distance of 16 ft. 6 in. from the centre of the crane pivot; an indicating device informs the crane driver of the position of the counterweight at all times.

The boom is of high-grade steel plate construction, and is pivoted to the steel casting of the revolving platform. It can be raised and lowered during working periods. Two groups of fixed rope sheaves are provided; one of them,



Two 60-ton Ardetwerke mobile cranes lifting heavy rolling stock after an accident

located at the bend of the boom, is designed for the 60-ton load, and the other, one at the end of the jib, is used for smaller loads up to 15 tons. The crane is driven by a horizontal twin steam engine, for which steam is generated in a vertical tube boiler having a heating surface of 200 sq. ft. and a working pressure of 142 lb. per sq. in. Two hoisting drums are provided for the two groups of sheaves in the boom, and a shifting gear system incorporated in the hoists is used for raising the hooks quickly when empty or when carrying only small loads. The proportions of the drums are such as to accommodate the entire length of the cable in a single winding. The 60-ton load is suspended from eight lengths of rope, of 1.42 in. dia., one of which is used for raising and lowering the boom. When ready for transportation, the front end of the jib is supported on a flat 4-wheeled car. In the motor-driven crane, the construction is the same as that described, except that in place of the steam engine there is a four-cylinder diesel motor of about 80 h.p. The motor flywheel is equipped with a multiple disc clutch for use when engaging or disengaging the drive.

The other crane illustrated is a locomotive slewing crane mounted on three axles, and provided with an automatic weighing machine with rope-weight compensation. This crane, which is used for railway constructional work, has a 3-tons lifting capacity at 31 ft. radius. Besides these cranes, similar but heavier types have already been built by the Ardetwerke, and are working in Germany and in other parts of the world, for example, Argentina, Chile, China, Russia, and other countries; ten units are now actually on order.



Locomotive slewing crane of 3-tons capacity

Minor Sources of Railway Revenue

APART from the revenue which is derived by railway companies in Great Britain from railway working proper, and the operation of ancillary businesses such as docks, steamboats and hotels, substantial amounts appear regularly in their annual accounts under the heading of "miscellaneous receipts." The bulk of these represents the rentals derived from houses and lands owned by the companies which are leased for industrial and other purposes, while a useful sum is earned from the rental of shops, as in recent years the companies have devoted considerable attention to augmenting this source of revenue. The L.M.S.R., for instance, has been particularly active in developing vacant sites on overbridges by erecting shops for rental by tobacconists, and other tradespeople. In connection with the general modernisation of stations which is proceeding, it has been found possible in many cases to incorporate shops and even cinemas within the station premises. Many of these shops are of the most modern design, and have been let to chemists, hairdressers, fruiterers and florists, jewellers, and so on. Space along the railway embankments has been let for many years to railway employees for allotment purposes, while market gardeners and seedsmen find sites adjacent to the line admirable for growing and permanently advertising their produce. Grazing rights are let in many districts, and a steady revenue is earned from the sale of hay and grass from railway embankments, but possibly the most unexpected source of revenue is that obtained for the right to collect water lilies from one stretch of a railway canal.

Apart from these general estate department activities, a considerable sum is earned in other ways such as from the right to run bookstalls at stations, which are let to firms such as Wyman & Sons or W. H. Smith & Sons on payment of a percentage of their gross receipts, with an appropriate minimum rental. Refreshment rooms are

frequently let to tenants at stations where the companies do not themselves desire to operate them, and the rights of vending cigarettes and tobacco, confectionery, ice-cream and similar commodities at railway stations bring in useful sums annually. The familiar red automatic machines of varying types from which tobacco, cigarettes, matches and many kinds of sweetmeats may be obtained, are to be found at railway stations throughout the country, and make their contribution to railway revenue. These are operated principally by the British Automatic Co. Ltd., which pays an agreed percentage of receipts, coupled with a minimum annual rental, for the privilege of placing them on railway property. Insurance of passengers and their luggage is also conducted through railway booking offices on behalf of companies, such as the Railway Passengers' Assurance Company and the Travellers' Insurance Association Limited, which pay a percentage of the gross premiums for the privilege.

The rights of advertising on hoardings and similar sites belonging to the railways or erected on railway property have for long been a fruitful source of revenue, and three of the main-line companies undertake this work themselves, instead of through agents, with very satisfactory results. It is still the general practice, however, to place the right of commercial advertising on railway road vehicles with outside advertising contractors, who usually pay an agreed annual sum per vehicle for the privilege. Considerable revenue, apart from publicity, is secured from the advertisements in, and sale of, the annual holiday guides published by the companies, as well as by the sale of travel publications and jig-saw puzzles portraying locomotives or scenes of interest on the line concerned. A growing revenue is also being secured from vehicles plying for hire at stations, and the provision of parking facilities for motorcars and bicycles.

MACHINING SUPERHEATER FLUE TUBES FOR LOCOMOTIVE BOILERS

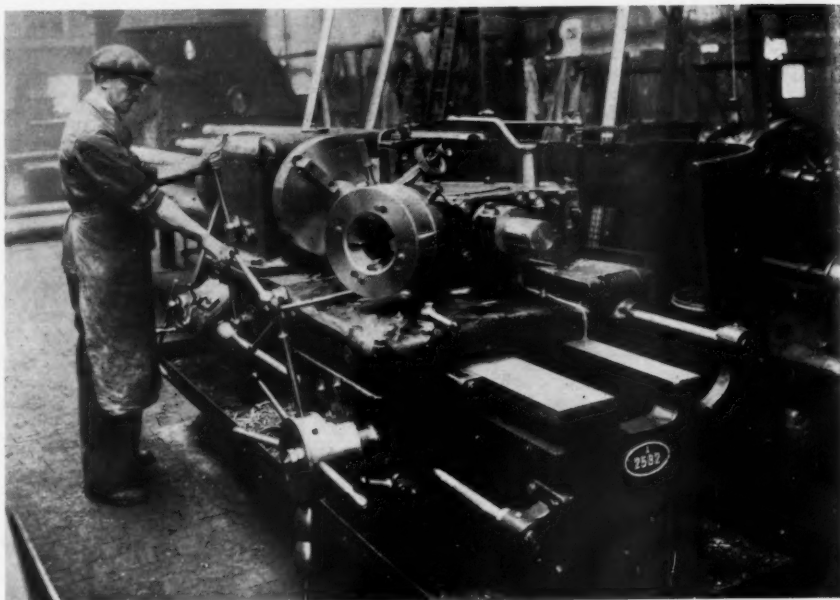
New Machine installed in the Great Western Railway works, Swindon

DURING a recent visit to the Swindon locomotive works of the Great Western Railway, we noted with interest that a new machine tool had recently been installed for turning, boring, and screwing superheater flue tubes, and this and the operations carried out on it are illustrated in the two photographs reproduced.*

Two spindle speeds are available, i.e., 80 and 20 r.p.m., and the turret saddle has quick power traverse in both directions. The first operation consists of turning, boring and chamfering. The boring bar has two cutting tools, one for boring and the other for chamfering the end of the tube, and a knee tool holder is used in conjunction therewith for turning the outside of the tube before screwing. The second operation is that of screwing, for which purpose a $4\frac{1}{2}$ -in. Coventry die head is used. A parting-off tool slide is fitted to the turret, and this is used for parting-off tools to length as required.

The machine is a $11\frac{1}{2}$ -in. centre lathe driven by a single pulley, with friction clutch and brake for stopping and starting, operated by a lever at the front of the bed. Change from fast to slow speed is effected by a lever in

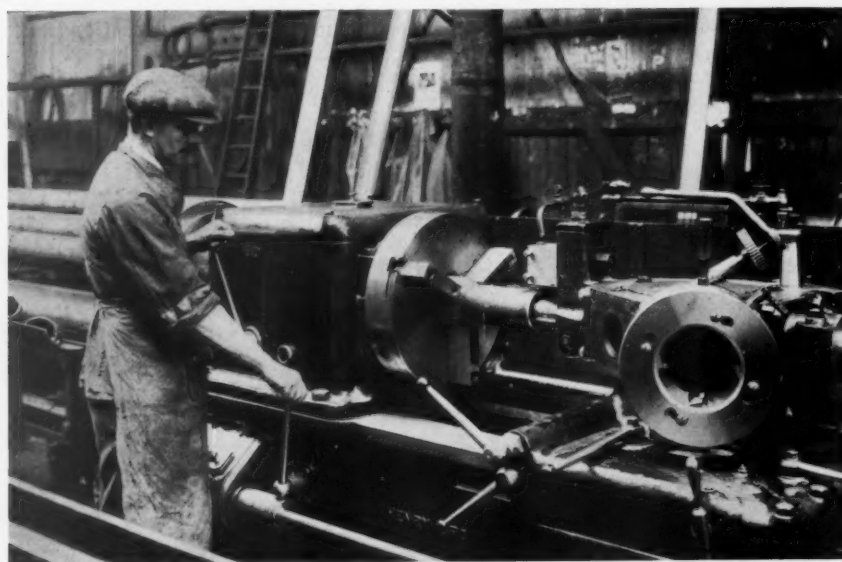
* By courtesy of Mr. C. B. Collett, Chief Mechanical Engineer, Great Western Railway.



Machinery Superheater Flue Tubes at Swindon Works

front of the headstock operating a double plate friction clutch. The spindle is operated by parallel capped gun-metal bearings of 8 in. diameter, ball thrust washers taking the end thrust either way. The spindle is hollow and has a three-jaw concentric chuck fitted at each end, for gripping the tubes for machining. The front chuck is mounted on a solid flange on the spindle, and the rear one on a back-

plate. Six changes of feed are provided in either direction, ranging from 11 to 66 cuts per in. The turret is of large dimensions, measuring 16 in. across the flat, and is mounted on roller and ball-thrust bearings for easy movement. The bed of the box section is 16 in. wide across the flats. This machine is manufactured by Henry Broadbent Limited, Sowerby Bridge, Yorks.



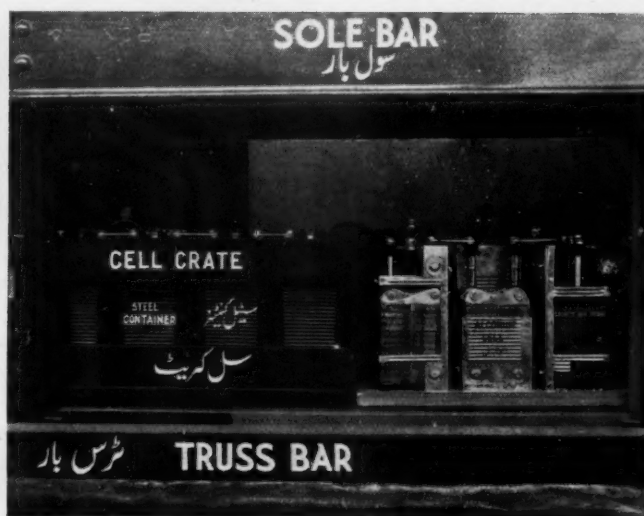
Close-up view of machining operation

FRENCH RAILWAY RECEIPTS IN 1937.—Receipts of the French main-line railways for 1937 were Fr. 12,319,134,000, compared with Fr. 10,037,738,000 in 1936, an increase of 22.69 per cent., as follows (in thousands of francs): Alsace-Lorraine, 921,170 (compared with 644,229 in 1936); Est, 1,800,163 (1,410,923); Etat, 1,913,021 (1,615,639); Nord, 1,972,200 (1,568,547); P.O.-Midi, 2,301,350 (2,013,017); and P.L.M., 3,411,230 (2,785,383).

N.W.R. Exhibits at Lahore Exhibition

(see page 107)

Right: The "Eagle" on her place of honour outside the locomotive workshops in Maghalpura, and (below) the "Eagle" and the Garratt locomotives on show at Lahore exhibition



Above: The "cut-away" latteries on the carriage. Note the names of all parts in English and Urdu

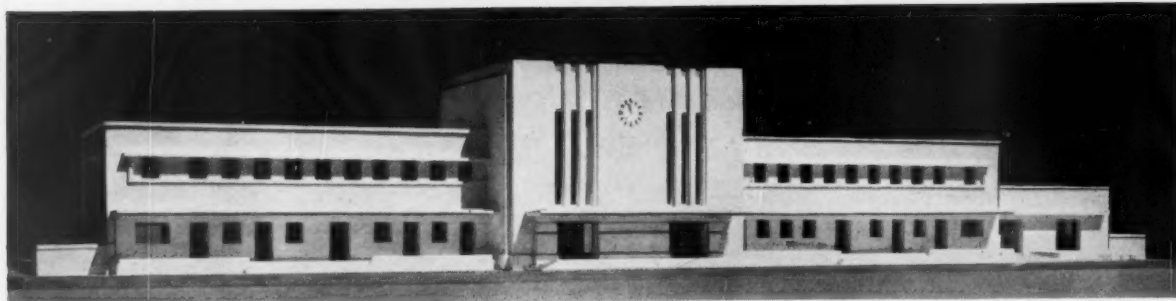
Left: The carriage exhibit showing the construction of a third class compartment in section



Above: The scene at Euston station last Saturday on the arrival of Mr. de Valera and other Ministers of the Eire Government



Right: The 17-vehicle "City of Los Angeles" streamlined diesel train on its way to New York for exhibition at the Grand Central station and prior to its "special holiday voyage" to Sun Valley, Idaho, referred to in an editorial note on page 99



Road elevation of model of the new station building at Asiût now under construction for the Egyptian State Railways at a cost of about £18,000

RAILWAY NEWS SECTION

PERSONAL

The King of the Belgians has conferred upon Mr. Edward Huskisson, General Manager of Thos. Cook & Son Ltd., the honour of Chevalier of the Order of the Crown, in recognition of the long association of his company with the development of tourist traffic in Belgium.

The Directors of the Rohilkund and Kumaon Railway Company have appointed Sir James Williamson, the company's late Agent in India, to be Secretary, in place of Lt.-Col. W. R. Izat.

Mr. A. Botwood and Mr. B. B. Winter have been appointed Directors of Karriers Motors Limited.

Messrs. J. J. Kesting, W. C. B. Pretorius, C. A. Humphreys, and W. G. Reed have been appointed Road Transport Officers, South African Railways and Harbours Board, at Johannesburg (headquarters), Cape Town, Port Elizabeth, and Durban respectively.

The Swiss Federal Railways have appointed Mr. Gebhard Frei as Assistant to the Chief Traffic Manager. Mr. Frei entered railway service in 1903 and has been in the Federal Department for Railways and Post Office since 1924. He has also been a member of the Military Commission of Railways since 1936.

Dr. Reinhold Furrer has been appointed Manager of the World Postal Union headquarters in Berne, as successor to Mr. Garbani-Nerini, who is retiring. Dr. Furrer was a former official of the Gotthard Railway and afterwards of the Swiss Federal Railways; he became General Manager of the Swiss Post Office in 1918, and later also of the telegraph and telephone administrations. Since 1935 he has been Manager of the Office international des Transports par Chemin de fer.

The present General Manager (Präsident der Generaldirektion) of the Swiss Federal Railways, Dr. Schrafl, has been appointed by the Federal Council to succeed Dr. Furrer as Manager of the Office international des Transports par Chemin de fer. Dr. Schrafl has been on the management of the Federal Railways since 1922, and has held his present position since 1926.

We regret to record the recent death at the age of 86 of Mr. Thomas Henry Rendell, formerly General Manager and a Director of the Barry Railway. Mr. Rendell was educated at Fullands College, Taunton, and entered the service of the Great Western Railway in 1870. His practical training was obtained in the Goods Department,

engineering; also of the technical and practical sides of mechanical and electrical engineering. Mr. Rendell retired from the Great Western Railway, and was appointed General Manager of the Barry Railway in March, 1912. In 1906 he was one of the six railway officers appointed by the Board of Trade to form, along with certain traders, a sub-committee of the Board of Trade Railway Conference then being held. He gave evidence before the Royal Commission on Canals and Waterways in 1907, and in 1908 before the commission appointed in connection with accounts and statistical returns rendered by railway companies. Mr. Rendell was Chairman of the Goods Manager's Conferences, also at the Railway Clearing House, for 1908, and had visited the United States with the International Railway Congress Association. He relinquished the general managership of the Barry Railway in 1919, on being elected to the board of the company.

Mr. F. V. Macdonald, whose appointment as General Manager, Gold Coast Government Railway, was recorded in our issue of December 10 last, received his engineering training from 1904 to 1908 as an apprentice to the late Mr. D. J. Reid, A.M.Inst.C.E., of Inverness. In 1909 he was appointed Assistant to the Resident Engineer on the construction of the Grangemouth waterworks, of the firm of Warren & Stuart, Glasgow. Until 1914 Mr. Macdonald was in the office of the District Engineer, Derby, of the former Great Northern Railway, and also at King's Cross. During the war he saw service with the Seaforth and Gordon Highlanders (1914-17) and was thereafter again employed in the G.N.R. head office at King's Cross until 1919. In the latter year he was appointed Assistant Engineer, Gold Coast Government Railway, and became District Engineer in 1927. From November, 1932, until his appointment as General Manager, Mr. Macdonald was Chief Engineer of the railway.

Mr. Sydney Philip Jones, appointed Assistant Solicitor (Common Law) of the London Passenger Transport Board (see our issue of January 7), has been for many years associated with the legal side of road transport, having been engaged for 25 years with Messrs.



The late Mr. Thomas Henry Rendell

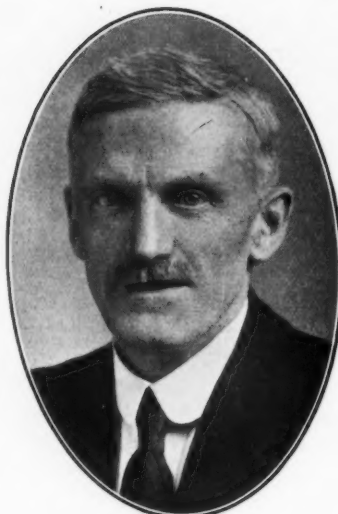
Chief Goods Manager, G.W.R., 1904-12, and General Manager, Barry Railway, 1912-1919

(A portrait taken about the time of his retirement)

wherein he was engaged for seven years in station work. This was followed by fifteen years in the Mineral Department of the Chief Goods Manager's Office. His experience, combined with the possession of many good qualities, led to his promotion to the office of the General Manager in 1891, where he was promoted to Chief Clerk (1898), and Chief Assistant to the General Manager (1904), until appointed Chief Goods Manager in May of the latter year. Of equable disposition and sound judgment, he was the possessor of a comprehensive knowledge of railway affairs, and although not trained as an engineer had a remarkable understanding of the technical side of bridge construction and many branches of civil

**Mr. H. J. Green**

Appointed Assistant to the Chief Engineer,
London Passenger Transport Board

**Mr. J. H. Harley-Mason**

Appointed New Works Engineer,
London Passenger Transport Board



[Photo]

[Lafayette]

Mr. J. H. Condy

Appointed Civil Engineer (Maintenance),
London Passenger Transport Board

**Mr. P. Croom Johnson**

Appointed Technical Officer to the Chief Stores
Superintendent's Department, London Passenger
Transport Board

**Mr. W. P. Henderson**

Appointed Chief Chemist, Euston,
L.M.S.R.

**Mr. J. Thom, M.I.Mech.E.**

Appointed Assistant Works Superintendent,
Crewe (Loco.), L.M.S.R.

**ANNUAL DINNER,
SOUTH AMERICAN CENTRE,
INSTITUTION OF LOCOMOTIVE
ENGINEERS**

(See page 108)

Left to right (facing the camera): Messrs. M. F. Ryan, C.B.E., General Manager, B.A.P.R.; C. E. S. Dodd, Counsellor to the British Embassy; F. Campbell, Chairman; Engineer A. Vaquer, President, Argentine Centre of Engineers; S. G. Irving, C.M.G., Commercial Counsellor to British Embassy; and Major R. K. Hubbard, O.B.E., Assistant to Gen. Manager, Central Argentine Railway

Seated opposite (left to right): Messrs. R. Flack, Chief Accountant, Central Argentine Railway, and C. Case, Stores Supt., Central Argentine Railway



Joynson-Hicks & Co., Solicitors to the London General Omnibus Co. Ltd. Mr. Jones was articled to Mr. Ronald Macdonald, formerly a partner of Messrs. Joynson-Hicks & Co., and who is at the present time Chief Solicitor (Common Law) to the London Passenger Transport Board.

Mr. H. J. Green, who, as recorded in our issue of January 7, has been appointed Assistant to the Chief Engineer, London Passenger Transport Board, is a Wiltshireman, but received engineering training in America, employed on the Grand Trunk Pacific Railway as Reconnaissance and Survey Engineer during preliminary work for the route through the Yellowhead Pass, Rocky Mountains. Later, he was engaged as Construction Engineer on the Mountain Division of that railway. Immediately prior to the war Mr. Green was appointed Survey and Reconnaissance Engineer for the Pacific Great Eastern Railway. He returned to England on the outbreak of war and enlisted in the Royal Fusiliers (Public Schools Brigade). Later he was commissioned in the Royal Engineers, commanding the 259th and 10th Companies, R.E., and was awarded the Military Cross in 1917. After the war he was engaged in harbour and dock construction, and later entered the service of the Metropolitan Railway as Assistant Engineer. After the death of Mr. E. A. Wilson, Mr. Green was appointed Acting Chief Civil Engineer, and on the formation of the London Passenger Transport Board was appointed Assistant Civil Engineer to the board. Mr. Green is a Member of the Institution of Civil Engineers, a Member of the Institution of Mechanical Engineers, and a Member of the Institute of Transport.

Mr. J. H. Harley-Mason, who, as recorded in our issue of January 7, has been appointed new Works Engineer, London Passenger Transport Board, received his training at the Crystal Palace School of Practical Engineering, under Mr. Maurice Wilson; he was then twelve years as assistant and latterly as Junior Partner in a firm of consulting engineers in Victoria Street. Joining the staff of Perry & Company, Public Works Contractors, as Contractors Engineer, Mr. Harley-Mason in this capacity, amongst many other works, built the ferro-concrete jetty at Tilbury, 1,800 ft. long, double-decked for trains, cranes, and warehouses; 10 miles of line for the G.W.R.; and the pedestrian subways at the Elephant & Castle, and Blackfriars. On the death of Mr. Charles Rowell he succeeded him as Chief Engineer of the firm. In 1922 Mr. A. R. Cooper appointed him New Works Assistant on the staff of the Underground railways, and in that capacity he prepared most of the schemes for extensions and alterations that have been put forward during the last fifteen years. He was also

responsible, under the Civil Engineer, for those schemes which were carried out by the Underground companies or the board's own staff. At the present time the structural side of civil engineering works on the Metropolitan Line improvements and the new stations at Aldgate East and King's Cross are his responsibility, on behalf of the Chief Engineer. Mr. Harley-Mason is a Member of the Institution of Civil Engineers, and a Fellow of the Royal Geographical Society.

Mr. J. H. Condry, whose appointment as Civil Engineer (Maintenance), London Passenger Transport Board, was recorded in our issue of January 7, gained his engineering training at Queen's University of Belfast. In 1920 he entered the Architect's Department of the Great Eastern Railway and in the following year joined the Underground railways. He acted as Resident Engineer on various works in connection with the extension of the Hampstead Line to Edgware, and the Morden extension. In January, 1929, Mr. Condry was appointed Permanent Way Outdoor Assistant, responsible to the Civil Engineer for permanent way maintenance, and on formation of the board was made responsible for permanent way on its railways. In January, 1935, he was appointed an Officer of the board with the title of Assistant Engineer (Permanent Way). On several occasions he has been sent to study permanent way practice abroad, and in 1936 made an extensive tour of the Continent to study the question of rail welding. He is a Member of the Institution of Civil Engineers, a Member of the Institution of Mechanical Engineers, and a Council Member of the Permanent Way Institution. Mr. Condry interests himself in blind welfare work, and is a member of the Management Committee of the London Association of the Blind.

Mr. P. Croom Johnson, whose appointment as Technical Officer to the Chief Stores Superintendent's Department was recorded in our issue of January 7, was educated at Clifton College, and began his career in 1906, serving an articleship for three years in Cornwall and North Wales, where he gained general experience in the quarry industry. He continued in this industry for a further three years, and in 1912 was appointed Assistant Engineer in the Tramways and Highways Department of the City of Liverpool under the late Mr. John A. Brodie, then City Engineer. In 1915 he gained a commission in the Royal Garrison Artillery. He commanded a battery in the Ypres salient and was mentioned in despatches; he also served on the Italian front from 1917 until demobilisation in 1919. Resuming his former position in the City Engineer's office at Liverpool, Mr. Croom Johnson was in charge of direct labour works, costing approximately £1½ million, until 1922.

In 1923 he was appointed Resident Engineer for the Ministry of Transport on the Purfleet arterial road, and was later selected by the Ministry to take sole charge on the site of the structural alterations to the Menai suspension bridge, Anglesey. In 1924 he was appointed Assistant Permanent Way Engineer in the Tramways Department of the London County Council, and in 1925 he became Permanent Way Engineer, responsible for the maintenance of the whole of the 330 miles of track and all tramway buildings. Upon the formation of the London Passenger Transport Board, in the position of Permanent Way Engineer, Trams, he became responsible for 660 miles of track, probably the largest system in the world. Mr. Croom Johnson is a Member of the Institution of Civil Engineers, and a Member of the Institution of Municipal and County Engineers.

Mr. W. P. Henderson, whose appointment as Chief Chemist, Euston, L.M.S.R., was recorded in our issue of January 7, was educated at Allen Glens School and at the Royal Technical College, Glasgow. He entered the service of the former Caledonian Railway in December, 1913, as an Assistant Chemist. He left the Caledonian Railway to take up a position with the Nobels Explosives Company. Later, he was appointed Chemist with Lever Brothers Limited at Port Sunlight. In September, 1921, he was appointed Chief Chemist of the Caledonian Railway. On the grouping of the railways in 1923, Mr. Henderson was appointed Chemist of the Northern Division of the L.M.S.R., embracing the former Caledonian, the Glasgow & South-Western, and the Highland Railways. On the formation of the Chemists' Department under the Chief Mechanical Engineer in 1928, Mr. Henderson was appointed Head Chemist of the Central Division at Horwich, Lancashire. On the formation of the Research Department in 1933, he was appointed Assistant Chief Chemist and Chemist, Horwich. Mr. Henderson is a Fellow of the Institute of Chemistry of Great Britain and Ireland.

Mr. James Thom, who, as recorded in our issue of January 7, has been appointed Assistant Works Superintendent Crewe (Lcco), L.M.S.R., was educated at Inverurie Academy, and, for his technical training, at the Robert Gordon College, Aberdeen. He served his apprenticeship at Inverurie with the former Great North of Scotland Railway. In 1913 Mr. Thom went to West Africa as Assistant Engineer on construction of the Nigerian Eastern Railway. Returning to England in 1917, he spent some time with Scotts Marine Engine Erection, Greenock; Kitchen, of Leeds; and Nasmyth, Wilson & Co. Ltd., Patricroft. In 1919 he was ap-

pointed to Sir W. G. Armstrong, Whitworth and Co. Ltd. for the changeover at that company's Scotswood works from armaments to locomotive manufacture. While with the firm he was responsible for the development of welded fabrication on locomotives, diesel engines, and other commercial products. When, in 1937, the Scotswood works were again converted to the manufacture of armaments, Mr. Thom was appointed Works Manager of the Locomotive Workshops of Vickers-Armstrongs Limited, remaining there for the completion of steam locomotive and diesel-electric contracts. Mr. Thom is a Member of the Institution of Mechanical Engineers, and was awarded the "Trevithick" prize by the Institution of Locomotive Engineers for the session 1935/6.

We regret to record the death at Chester on January 14 of Mr. R. W. Hughes, Goods Agent of the former London & North Western Railway at Chester from 1914-21. Mr. Hughes had previously occupied a similar position at Bangor. During the war he was concerned with handling the war materials for the Western Command, the headquarters of which are at Chester.

Mr. Edward H. Gurton, Manager, Land Settlement and Development, Canadian National Railways, at St. Paul, Minn., was elected President of the American Railway Development Association at the 29th annual convention which recently concluded in Chicago. Next year, the sessions will be held in Montreal. Mr. Gurton was born in London in 1885, and went to Canada as an immigrant in 1903.

Mr. T. H. Cooper has been appointed Comptroller of Finance & Accounting, Canadian National Railways, in place of Mr. J. B. McLaren, who has retired after 45 years' service.

Mr. A. C. Egan, Auditor of Disbursement, and Mr. W. S. Harrison, Auditor of Revenues, have been appointed Assistant Comptrollers, all these appointments having effect from January 1.

Mr. Cooper began his railway career in the Engineering Department of one of the constituents of the L.M.S.R. at Manchester, and went out to Canada in 1912, where he joined the Accounting Department of the Grand Trunk Railway. After rapid promotion he became Assistant to the General Auditor in 1918, and in 1922 was placed on special duty in connection with the amalgamation of the lines now forming the C.N.R. system. On completion of the reorganisation Mr. Cooper was appointed Assistant to the Vice-President of Finance & Accounting, and later became General Auditor, finally being promoted Assistant Comptroller in 1936. In his new position he is Chief Accounting Officer for the C.N.R., the West Indies Steamships, and subsidiary companies in Canada and the U.S.A.

Mr. Arthur H. Coleman, Divisional Traffic Superintendent, Bahia Blanca, Buenos Ayres Great Southern Railway, completed 50 years' service with that company on November 7 last. The event was celebrated by a dinner, at which Mr. Coleman was entertained by his railway colleagues; the function was attended by most of the chief officers and their wives, and the staff of the Traffic and Operating Departments, who travelled down to Bahia Blanca for the occasion. The gathering numbered 74. Speeches were made by Messrs. C. R. S. Harris, Director-General, B.A.G.S. & B.A. Western Railways, who presented Mr. Coleman with a suitably inscribed silver tray from his colleagues; Mr. T. B. Stewart, Traffic Superintendent of both railways; and Mr. Ormond Steven, M.C., Chief of Operation. Mr. Coleman, who suitably acknowledged the gift, gave some interesting reminiscences of his half-century of railway service.

We regret to announce the sudden death of Mr. B. L. Harvey, Deputy Chief Engineer, Eastern Bengal Railway, of heart failure at Shillong on January 3. His remains were brought down to Calcutta for cremation on January 5 in the presence of a large number of friends and relations. Mr. Harvey joined the Eastern Bengal Railway as an Assistant Engineer in 1912, and after a distinguished war service from 1914 to 1920, he was posted as Sleeper Control Officer, Eastern Group. Later he was transferred to the Ballybridge construction under the successive Engineers-in-Chief Messrs. Johnstone and Sleight. More recently his experience in bridge construction caused him to be placed in charge of the Hardinge bridge protection works at Paksey. Here, prolonged work by day and night enabled him to overcome the danger that threatened the safety of this great bridge. Mr. Harvey was next posted to the administrative headquarters of the E.B.R. as Deputy Chief Engineer. He went to Assam a short time ago as Deputy Chief Engineer, Surveys, in connection with the proposal for the construction of a railway bridge over the Brahmaputra river between Amingaon and Gauhati. He was a brother of Mr. A. F. Harvey, Agent of the Eastern Bengal Railway, President-elect of the Indian Railway Conference Association.

We regret to record the death on January 2 of Mr. William Thomas, who retired at the end of 1926 from the position of Chief Inspector, Great Western Railway. During the last 20 years of his service with the railway Mr. Thomas had been in charge of all Royal train journeys, and in that capacity had received various presentations, appreciative letters, and signed photographs from members of the Royal Family. He served with the G.W.R. for 53 years, in which time he travelled over 1½ million miles on duty, and officially visited every station on the

system; he had also filled every grade, operative or supervisory, in the Traffic Department. Five G.W.R. chairmen, seven general managers, and six superintendents of the line held office during Mr. Thomas's service with the company.

The funeral took place on January 8, at Pontypool. Among the officers of the G.W.R. or their representatives who attended were:—

Chief Inspector G. Partridge (representing Mr. F. R. Potter, Superintendent of the Line), Inspector M. W. Sanders (Office of Superintendent of the Line), Mr. S. G. Hearn (Assistant Divisional Superintendent, Newport, representing Mr. Trevor Roberts, Divisional Superintendent), Inspector W. Hodges (representing Mr. R. G. Pole, Divisional Superintendent, Bristol), Mr. S. E. Tyrwhitt (Assistant Locomotive Superintendent, Newport), and Mr. W. D. Pursall (representing Mr. J. M. Wildsmith, District Goods Manager, Newport).

On December 29, 1937, a retired railway engineer, Herr Hugo van den Bergh, of Weisser Hirsch, near Dresden, completed his 100th year in remarkable bodily and mental health. Dr. Dormmüller, Minister of Transport and General Manager of the Reichsbahn, paid him a special visit and brought a greeting letter signed by Herr Hitler; he referred in a congratulatory speech to the various activities of Herr van den Bergh, in the course of which he had been associated with him on different parts of the railway. Herr van den Bergh, who comes from an engineering family, was engaged in bridge construction in the '60's, and after serving in the war of 1866 entered the service of the Upper Silesian Railways. In the war of 1870 he was with the railway troops under Dircksen, the builder of the Berlin Stadtbahn, and was afterwards occupied at Strasbourg, and then engaged on railway construction in various parts of Germany, until he became Operating Superintendent at Harburg in 1890. He was made Assistant Divisional Manager at Elberfeld in 1895, and retired in 1903.

INDIAN RAILWAY STAFF CHANGES

Mr. A. Cornish has been appointed to officiate as Chief Mechanical Engineer, N.W.R., as from November 26.

Mr. H. M. R. Morse has been appointed to officiate as Superintendent, Mechanical Workshops, N.W.R., as from November 26.

Mr. G. H. Goff has been appointed to officiate as Deputy Traffic Manager, Transportation, E.B.R., as from November 20, 1937.

Mr. R. G. Hughff has been appointed to officiate as Deputy Chief Mechanical Engineer, Jamalpur, E.I.R., as from November 1, 1937.

Mr. R. de Vere Irwin, Deputy Chief Mechanical Engineer, E.B.R., has been granted nine months' leave as from January 3.

Mr. A. C. Griffin, Divisional Superintendent, N.W.R., has been granted 4½ months' leave as from December 17, 1937.

Lord Horne on the Trade Outlook

At a luncheon given to Birmingham and Midland industrialists by the Earl of Dudley at the Midland Hotel, Birmingham, on January 13, Viscount Horne of Slamannan, Chairman of the G.W.R., referring to the outlook for British industry, said that the situation in which the country found itself and the trade figures for 1937 indicated a period of prosperity such as the country had long despaired of ever enjoying again. Trade figures, he said, showed that Great Britain had a greater volume not merely of internal but external trade than had been experienced since 1930. Stating that he saw no signs whatever of a slump, Lord Horne went on to say that though it was possible that since the earlier part of 1937 there had been something of a trade lull, he took the view that it was not altogether a bad thing. Earlier in the year commodity prices had risen too high and the drop in prices which had since occurred had, he was sure, unduly depressed the markets. He believed they would recover very soon. In a tribute to Birmingham Chamber of Commerce, Lord Horne said that organisation had shown great enterprise and had done much gratuitously for the public service of the country. It seemed to have been a tradition in the chamber that as much as possible should be contributed by it to the welfare of the country. So far as the railway was concerned it was obvious that its interests were bound up with those of industrialists and the organisation that represented them.

London East Divisional Engineer's Staff Dinner, S.R.

The annual dinner of the London East Engineer's Division, Southern Railway, took place on January 14, with Mr. F. E. Campion, Divisional Engineer, in the chair. Among these present were:—

Messrs. D. R. Bennett, N. E. V. Brady, H. E. Bromley, J. C. Butler, A. H. Cantrell, G. Cheale, A. B. Chester, J. T. Cloke, A. Curtis, A. Dean, L. Furnival, C. V. Hill, H. Jones, C. W. King, F. Lowe, P. Nunn, T. Pease, H. E. Roberts, H. V. Russ, D. Sheppy, J. Symes, J. E. Taylor, C. F. Tofts, A. E. Usherwood, and W. A. Willox.

Mr. King, Assistant Divisional Engineer, proposed the toast of "The Chairman" and paid a tribute to the skill and efficiency with which he guided the activities of his department. Mr. Campion, in reply, after reading a letter of encouragement from the Chief Engineer, referred to the increasingly heavy work thrown on the Engineer's Department by the growing demands of the Traffic Department, and thanked all the members of his staff for their loyal and conscientious work. Mr. Campion mentioned with appreciation the increased attendance at first-aid classes. The fact that seven members of the staff had,

unfortunately, been killed on duty during the past year impelled him to urge all those whose work took them out on to the line specially to study and attend to safety rules.

Mr. J. T. Cloke, Chief Clerk, proposed the toast of "The Visitors," and Mr. P. Nunn, Divisional Superintendent, responded.

Traffic to the Empire Exhibition, Glasgow

Although the £10,000,000 Empire Exhibition at Bellahouston Park, Glasgow, will not open until May 3 (when the opening ceremony will be performed by the King) extensive transport arrangements have already been made by the L.M.S.R. No fewer than 1,650 special excursion trains have been scheduled to run in connection with the exhibition, over 200 having already been arranged from stations in England and Wales whilst the remainder will originate in Scotland. Organised parties aggregating over 24,000 passengers have also been booked in advance.

To accommodate the large numbers of people who will travel out to the exhibition grounds, an intensive train service will be provided from Glasgow (Central) to Ibrox and from Glasgow (St. Enoch) to a new halt which is being constructed at Bellahouston Park. Both Ibrox and Bellahouston Park are only nine minutes' train journey from Glasgow. For passengers travelling from practically every station in Scotland, regular day and seven-day cheap fares will be in operation; a special feature will be the issue after 4 p.m. daily of combined rail-and-admission tickets at low rates.

The L.M.S.R. is arranging two-day and three-day tours around the city (Clyde Coast, Kyles of Bute, Edinburgh, &c.) for organised parties visiting the exhibition, while a large volume of inquiries is already being received by the company from overseas. Admission tickets for the Empire Exhibition are being stocked at all L.M.S. stations where there is likely to be a demand for them.

A heavy freight traffic is already being dealt with by the L.M.S.R. in connection with the construction and equipment of the exhibition, over 2,500 tons having already been handled. The nearest goods station to the exhibition is Govan (L.M.S.) which is well equipped with cranes and discharging facilities, and which it is expected will be capable of dealing with all the traffic. In order to simplify the arrangements for goods traffic, the exhibition grounds are being treated as being within the Glasgow cartage boundary, and the conveyance rates will be those applicable to Glasgow stations plus the cartage rates and any additional charges in respect of consignments of exceptional dimensions. All passenger train parcels traffic for

consignees within the exhibition will be dealt with at Crookston L.M.S. station, the exhibition grounds being within the free delivery area of that station.

Institute of Transport Manchester, Liverpool and District Section Dinner

Mr. C. H. Stafford presided over the dinner of the Manchester, Liverpool and District Section of the Institute of Transport on January 14 at the Grand Hotel, Manchester.

Sir Ernest Simon, proposing the toast of "The Institute of Transport," referred to the lack of planning which so markedly differentiated the cities of this country from those particularly of Germany and Soviet Russia. He had no liking for dictatorships and saw no good reason why a country like our own should fall behind in so important a matter, in which transport would perhaps be the key to the whole thing. In his opinion the institute could render great service to South-East Lancashire by insisting on the formation of a planning body which would deal with the future of Manchester with something like the same courage and vision as were being shown today in Moscow and Berlin.

Sir Alexander Gibb, in the course of his reply, referred to Lancashire's part in the pioneering work of transport. In that county the first trials were given to several forms of transport, and as a result the area had enjoyed unparalleled prosperity. The Sankey Brook Canal was very nearly the first canal in England, while the Duke of Bridgewater's Canal, built by Brindley, resulted in Manchester getting its coal more cheaply. The success of the Bridgewater Canal led to 142 Acts being passed to construct canals within 42 years. Other notable achievements were the Trent and Mersey Canal and the Manchester Ship Canal. As regards railways, Lancashire was also a pioneer, as witness the Liverpool and Manchester, and the Manchester and Bolton Railways.

L.M.S.R. "INCLUSIVE WEEKENDS" AT BLACKPOOL.—As the result of the success of the L.M.S.R. "inclusive holiday" scheme at Blackpool introduced in August of last year, it has been decided to continue this feature. Holidaymakers can make arrangements at the station of departure to reserve accommodation in Blackpool on notice being given not less than five days in advance. The holidaymaker is thus relieved of the trouble of finding suitable accommodation himself. Since the scheme was introduced considerable numbers of passengers have taken advantage of the "all in" arrangements.

The Electrical Industry in 1937

For many branches of British industry the year of 1937 must be accounted a relatively prosperous one, and the reports we have received from the larger organisations in the electrical industry are distinctly cheerful in tone, for the volume of orders was such as to necessitate almost everywhere an extension of works and facilities for manufacture. Railway electrification continues to make its modest but fairly steady demands for new equipment, and this activity was described in the Electric Traction Supplement of THE RAILWAY GAZETTE for January 7. The following notes relate to other activities and developments of interest to railway engineers.

The British Thomson-Houston Co. Ltd.

Electrical equipment for locomotive-testing brake coaches was ordered by the L.M.S.R. In these coaches the braking effect is to be provided by axle driven a.c. generators with fields controlled by Thyratrons.

Orders were received from Henry J. Coles Limited for nearly a hundred electrical equipments for mobile cranes. Each equipment includes d.c. motors for the various motions, and a special d.c. generator to be driven by a diesel power unit. Because it has a falling voltage characteristic, this dynamo cannot overload the diesel. With each equipment the switch and controller for selecting and regulating the required motions are provided.

Supplied to Stothert & Pitt Limited were duplicate electrical equipments for driving 20-ton derricks. Each equipment comprised two 40 h.p., 1,000/66.6 r.p.m., a.c. commutator motors with the necessary control gear for enabling the hooks of a double hoist to be used either independently or in synchronism.

Electric discharge lamps for moderate and small outputs were placed on the market early in the year, so that this type of lamp is now obtainable in sizes ranging from 50 to 400 watts. The Mercra Fluorescent lamp became available in December, and for this the proportion of red in the spectrum is 6 per cent., which is a marked improvement on the figure for the ordinary Mercra lamp, but still very far short of the 25 per cent. obtainable with tungsten lamps. Being monochromatic, the light from the Sodra lamp cannot be modified by fluorescent powders, or by any other means, so that there was no development of this lamp to report.

Metropolitan-Vickers Electrical Co. Ltd.

The research activities during 1937 included some further work in molybdenum-vanadium steels. Their creep resistance and other properties were examined at high temperatures, and the creep behaviour at atmospheric temperature of anti-vibration support materials was also investigated to de-

termine the most suitable material. During the year some new forms of magnetic crack detector were placed on the market, after having been proved useful in the company's own works. A material called Traffolyte, from which decorative veneers and panels can be made, found some new applications in shops, restaurants, passenger vessels, and railway carriages, and a heat resistant variety known as Blisterproof was introduced. Early in the year 80 and 125 watt mercury vapour lamps were placed on the market. These met the need for increased lighting in side streets, and at the same time obviated the need for imposing any extra load upon the existing cables. A lamp to burn in the horizontal position, others utilising the principle of fluorescence for colour improvement, and a "dark" lamp for radiating a high percentage of ultra-violet light, were also made available during the year.

The General Railway Signal Co. Ltd., of London, for whom the Metropolitan-Vickers Electrical Co. manufacture railway signal material, are supplying and installing semi-automatic signalling between Shenfield and Southend, some 20 miles, including Southend station. In India the G.R.S. Company is about to install a small relay interlocking between Hooghly Ghat and Garifa on the East Indian Railway. This is a gauntlet track over a bridge between these two stations, necessitating one-way working as on a single track, and will be the first relay interlocking in India. In addition large orders have been received from Dominion and home railways for various standard types of signal equipment.

The English Electric Co. Ltd.

Apart from the developments described in the recent electric traction supplement, and relating to electric or diesel-electric traction, nothing of direct interest to railway engineers was reported by this company, though in the electric power and industrial fields many important orders were received or executed. To augment existing facilities for research the company now has under construction a new switchgear testing station and laboratories.

The General Electric Co. Ltd.

Developments in lighting almost identical with those reported by the B.T.H. and Met-Vick Companies were reported also by this company, which, in addition, announced the development of new forms of lantern for housing the new sizes and types of Osira mercury vapour lamp. Between 600 and 700 miles of roads in Great Britain are now lit by Osira lamps. Fluorescent tube lighting made some advance during the year, and several important installations were put into commission.

Many important railway signalling and traffic signalling contracts have been carried out by the Siemens and General Electric Railway Signal Co. Ltd. A reliable axle counting equipment has been introduced for use in situations where conditions are difficult, such as tunnels where ballast is very moist or where steel sleepers are used.

Crompton-Parkinson Limited

On the cessation of diesel traction activity by Sir W. G. Armstrong, Whitworth & Company, the Crompton-West traction organisation, in conjunction with other electrical manufacturers, took an assignment of the patents of the Armstrong Whitworth automatic diesel control scheme. Diesel electric railcars and locomotives equipped by Crompton-West, principally for Armstrong, Whitworth & Company, gave good service during the year, and special mention was made of the shunting locomotives in service on the L.M.S.R. and on the Bombay, Baroda and Central India Railway.

The whole of the electrical equipment of sixty-four two-coach units for the North Tyneside modernisation of the L.N.E.R. was delivered during the year, and the improved service began on January 3, 1938. Though of Crompton-West manufacture the equipment was supplied through Associated Manufacturers of Electric Traction Equipment Limited, under whose auspices the Crompton-West organisation was given technical assistance and the benefits of a long practical experience of electric traction work by the British Thomson-Houston Company.

All the motors and one set of train equipment were supplied for use in experimental tube trains built by the L.P.T.B., and later in the year, when trials had been completed, an order for over eight hundred motors was received from the board, and another order, also very large, came via the British Thomson-Houston Company for control equipments. The manufacturing facilities of the company are being extended and improved so that in a short while the Crompton-West traction factory will be one of the finest in the country.

"GLASS TRAIN" TOURS IN THE BAVARIAN ALPS.—The famous "glass train" of the Reichsbahn, consisting of observation cars with all-glass walls and sliding roof, giving passengers an uninterrupted view of the surrounding country, is touring the Bavarian Alps every Sunday and public holiday during the winter season. The route varies to enable passengers to see Berchtesgaden, Garmisch-Partenkirchen, Mittenwald, and other favourite Bavarian beauty spots; one special trip goes as far as Zell am See. No winter sports equipment may be taken on the "glass train."

Metropolitan Line Improvements

The reconstruction works on the Metropolitan Line, particularly those in connection with the projection of Bakerloo trains out to Wembley and Stanmore, have necessitated the enforcement of speed restrictions over certain sections of the line between Finchley Road and Harrow, with the result that fast trains require, as a minimum, a four-minute extension of schedule between Harrow and Baker Street, and stopping trains a one- or two-minute extension. In answer to complaints of delays on the Metropolitan Line, the London Passenger Transport Board has explained that this is unavoidable during the transition from the old to the new system of operation. The restrictions will be removed as soon as possible, probably about the middle of the year. The board states that it is inevitable that there should be more than the usual number of unscheduled delays, as the whole of the line is being rearranged and also equipped with new signalling (details of the nature of the work involved herein appeared in our issue of January 29, 1937). A careful check is kept of such occurrences and special precautions are taken to keep them as few as possible.

It is hoped that when the new services are available the improved facilities and higher speeds will be accepted as compensation for any temporary delays. On the Bakerloo Line there will be a peak hour service of 15 trains an hour between Wembley Park, and Elephant & Castle stations, and approximately the same number in normal hours. Eight trains an hour will continue to Stanmore. These trains will consist of the latest type of rolling stock, which has more accommodation for passengers as there are no motor compartments, all the driving equipment being carried beneath the floor. Metropolitan main-line passengers will be provided with a direct service to Piccadilly Circus and other West End stations by walking across the platforms at either Wembley Park or Finchley Road stations. They will thus be saved the necessity of the transfer at Baker Street which occupies on an average 5 min. The number of Metropolitan passengers who transfer between the surface trains and tube trains at Baker Street is now approximately 4,000,000 a year. An example of what the improvements will mean is that a passenger from West Hampstead will arrive at Oxford Circus in 10 min. The journey from Finchley Road to Oxford Circus will occupy only 8 min. By crossing the platform, tube passengers may travel express between Wembley Park and Finchley Road. This will save three minutes on a journey. Both these stations will be reconstructed to enable passengers to transfer quickly and comfortably.

Because of awkward curves in the Metropolitan Line there have always been speed restrictions. When the tracks have been realigned the riding qualities of trains will be improved and speed restrictions removed. This advance, combined with the doubling of the track between Harrow and Rickmansworth and the electrification of the line between Rickmansworth, Amersham, and Chesham, will save 5 or 6 mins. on the journey between Baker Street and outlying stations. Four electric trains an hour will run north of Rickmansworth to provide a through service to Amersham and Chesham. These will be in addition to the two or three L.N.E.R. express steam trains an hour to Marylebone. The exchange of electric and steam locomotives on Metropolitan trains at Rickmansworth will no longer be necessary. By these means, in 1939, transport services north of Rickmansworth will be substantially improved.

For the express traffic 22 trains of compartment stock will be provided. The Metropolitan local trains will consist of modern stock similar to the latest District Line type. They will have air-worked doors. With the opening of the railway improvements, road services will be revised, so that London Transport facilities will be advanced together as a co-ordinated whole. Already there are indications that people are taking advantage of the assurance of better transport to build homes of good class in the attractive country of the Chalfonts and the Chilterns.

Many stations will be reconstructed. One of the largest of these works will be the rebuilding of the Harrow-on-the-Hill station. The present building, which serves four tracks, is not esteemed by the residents. The new station, with six tracks, will be an

architectural asset to the town and from the railway point of view it will be second to none in the board's system. Willesden Green will become an important centre. The population in the neighbourhood of this station numbers about 200,000 and there is a large traffic to the West End which will be facilitated by the running of additional trains between Willesden Green and Elephant & Castle. The journey to Piccadilly Circus will occupy only 15 min. Baker Street station will be largely rebuilt. The Metropolitan and Bakerloo stations will have one large booking hall. Tube passengers will be carried from street to platform on two flights of escalators. The lower flight will be used by passengers transferring between Metropolitan and Bakerloo trains.

What might be done at Oxford Circus was a problem that gave London Transport much concern. Several proposals were considered, but they had to be abandoned, because in addition to the two lines of double tube so many gas, sewer, electricity, telephone, and other services had to be encountered. It has now been decided to provide two large high-speed lifts, each having a capacity of 50 people and travelling 600 ft. per min. In the morning peak hour all five escalators will thus be made available to carry passengers upward to the street; in the evening peak hour they will all run downward. Passengers travelling in the opposite direction will be served by the fast lifts. This arrangement will increase the comfort and save the time of the passengers now using the station and will provide for the future traffic that will result from the extensions under the board's £40,000,000 programme. Oxford Circus will become the focal point of the extension to Denham in the west; and to Epping, and Hainault in the east; also the projection of the Bakerloo trains over the Metropolitan Line.

New Colour-Light Signalling, L.N.E.R.

On Sunday, December 12, 1937, the L.N.E.R. completed the re-signalling of the Shenfield-Chelmsford section of the Colchester main line, where automatic colour light signals have replaced the one-wire block telegraph between Shenfield and Ingatestone, and Hylands box and Chelmsford, as well as the former automatic semaphores between Ingatestone and Hylands box. The Shenfield-Ingatestone section was opened on October 24, 1937. Thoby, Hylands, Crompton's siding, and Chelmsford yard boxes have been closed and the refuge sidings at the two first-named removed. The up and down sidings at Ingatestone and Chelmsford have been converted into reception roads with power points. Searchlight double-filament signals have been installed with some mechanical colour lights at Chelmsford. Track circuits are d.c., fed from a metal

rectifier with A.D. primary cell in parallel, and location batteries are arranged on similar lines. This method of working is being extensively tried in the Southern area. Illuminated diagrams are of the normally-dark type. Automatic and certain controlled signals have telephones and provision for "P" signs later. Power is taken from a commercial supply at Ingatestone.

Apparatus cases, signals, &c., were supplied by General Railway Signal Co. Ltd.; track and line relays by Westinghouse Brake & Signal Co. Ltd.; selector telephones by Standard Telephones & Cables Limited. The scheme was carried out under Mr. R. J. M. Inglis, Engineer, and Colonel H. H. Mauldin, Superintendent (Eastern Section), by Mr. A. E. Tattersall, Signal and Telegraph Engineer (Southern Area). Mr. R. A. Green was Resident Engineer.

RAILWAY AND OTHER MEETINGS

Rohilkund and Kumaon Railway Co. Ltd.

The ordinary general meeting of the Rohilkund and Kumaon Railway Co. Ltd. was held on January 18, at 237, Gresham House, Old Broad Street, E.C.2. The Chairman, Lt.-Col. T. Gracey, R.E., presided. The Secretary, Sir James Williamson, read the notice convening the meeting and the auditors' report.

The Chairman, moving the adoption of the report and accounts, said he had great pleasure in reporting that Sir James Williamson, their late Agent, had been appointed Secretary since the last general meeting in the place of Lt.-Col. W. R. Izat, D.S.O., R.E., whom he was glad to say was still serving as a Director.

The working results of the joint undertaking for the year ended September 30, 1937, were very satisfactory, gross earnings amounted to Rs. 77.19 lakhs, which was Rs. 2.92 lakhs more than the record year of 1936. Coaching traffic showed a considerable increase both in receipts and the number of passengers carried, this occurring almost entirely under third class. Goods traffic also continued to expand, the total tonnage lifted increasing by nearly 49,000 tons and the receipts being about Rs. 88,000 more than last year.

The company's share of the net earnings of the joint undertaking amounted to £144,823, to which must be added the surplus profits of the Lucknow Bareilly Railway (£12,570) and gain by exchange (£923), making a total of £158,316 against £156,167 for the previous year, an increase of £2,149. After making the necessary adjustments on account of debenture interest, preference, and interim dividends, making a grant of £1,000 to the Bengal & North Western Railway compassionate fund, transferring £9,000 to the contingency fund, and providing £8,600 for the Secretary of State's share of surplus profits, the amount then to be dealt with was £59,584, practically the same as last year. Out of that sum the Directors proposed to pay a final dividend of 6 per cent. with a bonus of 5 per cent., amounting to £38,133. This, together with the interim dividend and bonus of 7 per cent. already paid, would make a total distribution of 18 per cent. for the year. The carry forward to next year would be £21,451 2s. 3d.

In the course of years there had grown up a disproportion between the interim and final dividends declared, and to minimise this the board proposed to increase the interim dividend and decrease the final in the future; for instance, if they had a similarly good year next year to the one they had just passed through, the interim dividend would be, dividend 6 per cent., bonus 2 per cent.;

and final dividend 6 per cent., bonus 4 per cent.; being 8 per cent. and 10 per cent., instead of 7 per cent. and 11 per cent. as at present. The liability of the company to the industrial profits tax (National Defence Contribution) was under consideration of the Inland Revenue authorities, and until their decision was known nothing could be said on this matter. The possible sum involved had been provided for in the accounts.

Having dealt with the general financial situation of the company the Chairman went on to explain the necessity for the two items, viz.:—£1,000 granted to the Bengal & North Western Railway compassionate fund, and £9,000 placed to the credit of the contingency fund, mentioned above. Several years ago the board of the Bengal & North Western Railway placed £5,000 to the credit of a compassionate fund administered by their directors to help those members of their staff who through illness or misfortune had come on evil days. This sum, with the interest added, was sufficient for several years, but lately had become unduly depleted. In 1924 the staffs in India of the Bengal & North Western, and the Rohilkund & Kumaon Railways were amalgamated, greatly to the advantage of everybody; and amongst those helped by this compassionate fund had been members of the staff of the Rohilkund & Kumaon Railway, so the board considered it only right that the Rohilkund & Kumaon Railway should subscribe its proportion, namely one-fifth part of the £5,000 nominal at which the fund is supposed to stand. The fund was administered by the directors of the Bengal & North Western Railway, but there was no objection to this as the majority of their directors belong to the boards of both railways. The object of adding £9,000 to the contingency fund, making it with accrued interest £24,524 17s. 10d., was fully explained in the report and in his speech of last year; it was therefore not necessary to repeat it. The sum allotted would certainly be required if and when their contract with the Secretary of State was terminated, and what was now being done was to earmark £9,000 of it as compensation to the staff of their London office in the event of loss of employment. They had had two very good years in succession, and it was only prudent finance to set aside money in good years for liabilities that were foreseen. If the contract was not terminated in 1942 the money would be dealt with in the same manner as moneys in other reserve funds.

Besides these two items there were, the Chairman said, one or two points of general interest.

The monsoon was mild, rainfall being well distributed and at no time heavy or continuous enough to cause severe floods or any material damage to the railway or bridges. The sugar industry, with which the railway was intimately concerned, was now controlled by Government in Behar and the United Provinces. Among other clauses the Control Act would, it was hoped, provide for the better organisation of cane supplies to mills by a system of zoning, and the marketing of sugar, measures which it was hoped would be advantageous to both the industry and the railway.

They were suffering a good deal, especially on the Bareilly Kathgodam section, from road motor competition. There were rules laid down for the regulation of motor transport by Local Governments as to the licensing, loads to be carried, seating accommodation, &c., of public vehicles, but the public authorities who had the duty of enforcing these rules did not seem to be in a position to ensure that the regulations were complied with, with the result that private lorries much overloaded were allowed to ply as public vehicles very much how and as they liked. The ticketless traveller still continued to be a serious problem and to receive close attention by a special staff. Ticketless travelling was not increasing, but on the other hand it was not decreasing to any appreciable extent. The difficulty experienced in recruiting British officers, owing to the terms offered being insufficient to attract suitably qualified men under present-day conditions of service and prospects in India, gave rise to anxiety. The Indianisation of their superior staff was proceeding, but to ensure the successful operation of the company's railway it was necessary to maintain a sufficient leavening of British officers. This was now difficult to secure by reason of the inadequacy of the revised scale of pay introduced in 1932, when the drop in earnings caused by the great trade depression necessitated retrenchment. A memorandum had been sent to the Railway Board representing the inadequacy of the revised scales and that it was now necessary to revert to the company's old scales of pay for the superior staff.

During the year notice was received of the Government of India's decision that the company should give statutory effect to the Hours of Employment Regulations as from October last. When the Washington and Geneva Conventions first came under their consideration the manner and financial effect of their application was investigated and, although they were not then required to implement the conventions, much was done between 1930 and 1937 towards their final introduction. The fulfilment of the requirements of these regulations had increased the expenditure by Rs. 1.61 lakhs annually. To house the additional staff, quarters costing Rs. 3½ lakhs were being built. During the

year provincial autonomy in accordance with the Government of India Act came into force, and provinces were now governed by a Ministry elected by and accountable to the popular vote. The Indian National Congress formed the majority party in the Province with which they were concerned, the United Provinces. It was not to be expected that so great a transposition of the masses of India, from governed to governing, could happen without introducing unsettling conditions. The new Government had taken necessary measures for the maintenance of law and order and to

afford support against anti-social and dangerous agitators.

He was glad to say that the reports for the current year were so far satisfactory, and their thanks were due to the Agent and staff in India and in their London office for the excellent work they had done during the year.

The motion by the Chairman "that the report of the directors dated January 8, 1938, together with the audited statement of accounts and balance sheets for the year ended September 30, 1937, be, and they are hereby received, approved and

adopted," was seconded by Sir Leonard L. Cohen, K.C.V.O., and carried unanimously.

Mr. W. Stantiall seconded the Chairman's motion "that the final dividend of £6 per cent. and a bonus of £5 per cent. for the half-year ended September, 1937, on the ordinary stock of the company, subject to income tax, be, and the same is hereby declared, making with the ad-interim dividend of £4 per cent. and a bonus of £3 per cent. paid on July 26, 1937, a total dividend of £18 per cent. for the year ended September, 30, 1937." This was carried unanimously.

Lightweight Rolling Stock in France

An article contributed by M. Picard, formerly of the French State Railways, to the periodical *Mécanique* (November-December, 1937), considers the lightweight steel coach as a contribution to operating economy. The author states the question briefly as one of reducing weight in relation to passenger accommodation, so that at times of exceptional demand the extra numbers can be seated without exceeding the permissible loads for the locomotives, with the attendant circumstances of duplicated trains and the maintenance of engines, operating staff, and coaches, considerably in excess of average requirements. In planning for the future, M. Picard accepts it as inevitable that further additions to current standards of weight will have to be combated, in the shape of air-conditioning plant and sound-insulating equipment. Steel construction itself sent weight per seat up by some 20 per cent., although progress in lightweight constructional principles has already counteracted the additions from this source alone. For example, the Etat lightweight steel main-line coaches of 1937 had the same seating capacity and weight per seat as some corresponding vehicles introduced in 1911. The following table shows the steady increase in the weight of main-line vehicles on the Ouest and the Etat up to the steel coaches of 1930, compared with the recession achieved in the lightweight stock of 1937:—

Vehicle	Seats	Weight (tonnes)	Weight per seat (tonnes)
Four-wheel second class coach, 1850 ...	32	8	0.250
Corridor coach, 1902 ...	50	18	0.360
Bogie coach of 1911 ...	64	35	0.550
O.C.E.M. steel coach, 1930 ...	72	47	0.640
Etat lightweight steel stock, 1937 ...	64	35.2	0.550

In France, lightweight vehicle construction first received serious attention from railcar builders; particularly by the Michelin concern, upon which it was imposed by the limitations of pneumatic tyres, but also generally owing to the relation between the weight of the vehicle and the power

of the driving unit. At least 10 h.p. is allowed per tonne of tare weight. French railcar practice has energetically pursued the line of weight-reduction, to which M. Picard attributes the limited use in that country of electrical transmission systems. The savings realised are shown in the following table, as well as the later reaction from the extreme lightness of the earliest vehicles:—

Vehicle	Seats	Weight (tonnes)	Weight per seat (tonnes)
Pauline railcar, 1932 ...	61	6.5	0.160
800-h.p. Bugatti ...	57	31.5	0.550
Renault ABJ ...	52	30.0	0.575
56-seat Michelin ...	56	10.0	0.175

The method of saving weight first adopted was the use of lighter materials, and the Northern Railway of France made an early venture in this direction by producing steel coaches incorporating Alpac, aluminium, and other lightweight metals for the doors, partitions, and panels. Further use of light metals was made in 300 Etat suburban coaches introduced in 1930, having panelling and partitions of duralumin; sliding doors of Alpac; pure aluminium for the inside ceiling; and various alloys for fittings. These coaches were 2,200 kg. lighter than if they had been made of the materials normally in use for steel stock at the time. The same again extended the application of lightweight materials in some double-deck coaches built in 1933, wherein some 5 tonnes of light metals displaced 13,500 kg. of ordinary steel.

In the meanwhile, aluminium, its alloys, and high-tensile steels had been adopted overseas for the mechanical and structural parts of vehicles, as in the bogie frames, chassis, buffing and drawgear, and bodywork of a car introduced by the Pullman Car Company of the U.S.A. in 1932, representing a saving in weight of 37 tonnes. Australia in 1936 placed in service 12 coaches in which the frame girders were either a combination of steel and aluminium alloy, or built up of light alloy sections and the bodywork incorporated aluminium in considerable quantity, in conjunction with wood. By these means the weight per

seat was reduced to the remarkable figure of 0.34 tonnes.

Apart from the use of lighter materials, weight can be reduced by building with the smaller sections permitted by new and stronger steels incorporating chrome, manganese, vanadium, and so on. A departure with more influence on constructional technique is the adoption of stainless steel (18 per cent. chrome, 8 per cent. nickel), as in the Burlington Zephyr diesel train placed in service in the U.S.A. in 1934. When such steel is used, special precautions have to be taken in welding to avoid prolonged high temperatures deteriorating its rust-resisting properties. The Budd process of fabrication, evolved in the U.S.A. to meet these conditions, has recently been introduced into France.

Further means of weight-reduction considered by M. Picard are the use of welding, and attention to principles of construction so as to minimise the number of parts. In relation to the latter he mentions the design of bogies, and the construction of coaches as tubular girders, so that walls and roof share in taking the stresses formerly borne entirely by the underframe. As representatives of such technique, M. Picard quotes the Swiss lightweight bogie coaches of 1934 (described in our issue of August 24 of that year).

In the locomotive, the use of lightweight materials assists in keeping axleloads within the prescribed limits despite the addition of new equipment dictated by technical progress. M. Picard instances the substitution of lightweight materials for steel in boiler casings, footplates, cabs, and similar parts. Mechanically, too, as in such reciprocating parts as connecting rods, valves, pistons, and crossheads, the development and design of lightweight components promises much for the future.

SOUTH AFRICAN RAILWAYS TO BUILD LORRY ENGINES.—A Reuters message reports that instead of importing lorry engines for its road transport services, it is understood that the South African Railways and Harbours Administration intends to establish works at Pretoria for the manufacture of the engines.

NOTES AND NEWS

Belgian Railway Fares Raised.—An increase of 5 per cent. in passenger fares and goods rates on the Belgian railways came into force yesterday.

Indian Train Collision.—Seven persons were killed and many injured when the Calcutta-Delhi express came into collision with a goods train at Bamrauli station, near Allahabad on January 16.

Southern Main Line Repairs.—The line between Sevenoaks (Tubs Hill) and Tonbridge will be closed on Sundays, January 23 and 30, and February 6, 13, 20, and 27 in connection with the work of strengthening the up line at Hildenborough. A special bus service will be substituted. The work will be similar to that described in *THE RAILWAY GAZETTE* of December 3, 1937.

Southampton Docks Record Traffic.—All previous records for traffic passing through the Southern Railway Docks at Southampton were beaten during 1937. Shipping tonnage entering the docks totalled 19,552,354 tons, an increase of 5 per cent. over the previous highest figure of 1936. Passengers embarked or disembarked totalled 621,911, 10 per cent. more than for 1936. Imports and exports together were 15 per cent. higher than in 1936.

Railways Damaged in Storm.—Last week-end's storm caused a certain amount of damage and delay on the railways. An up express from Crewe to Euston ran into an overthrown signal-post near Hatch End, slightly damaging the engine and causing a delay to traffic. The L.M.S.R. railway embankment was cut between Workington and Maryport by a gale-driven tide. On the Great Western, high tides washed out sections of the line between Machynlleth and Aberystwyth.

New Turntables, L.M.S.R.—To extend the scope of larger engines, the L.M.S.R. is to spend over £56,000 on the installation of new turntables at 13 places on the system. Except for one of 50 ft. diameter to be provided at Manchester (Irwell Bridge), all the new turntables will be of 60 ft. diameter, and they will all be of the latest vacuum-operated type. The twelve new 60-ft. turntables are to be provided at Bradford (Forster Square), Gourock, Kettering, Largs, Lostock Hall (near Preston), Manningham (near Bradford), Nuneaton, Rhyl, Skipton, Sowerby Bridge, Warwick, and Workington.

L.N.E.R. London City Manager's Social.—The seventh annual dinner and dance of the London City Manager's staff, L.N.E.R., was held at the Liverpool Street Hotel on January 14, under the chairmanship of Mr. Percy Syder, London City Manager. Nearly 350 members of the staff were present. In proposing the toast of the London & North Eastern Railway, Mr. Syder said it must be gratifying to them all that the company's receipts had increased in a most satisfactory manner during the past year, and he was sure they all hoped and trusted the upward

movement in trade and industry would continue. He stated that those in charge of affairs had a difficult task to perform, and it was only by loyal co-operation they could hope to succeed. He thanked the whole of his staff for the great assistance they had rendered him during the year 1937, and knew that he could rely upon them for the future.

Cheaper Railway Fares in Roumania.—According to Reuters a 25 per cent. reduction in third class railway fares has been approved by the new Roumanian Government.

Paris Suburban Line Electrified.—Since January 18 all passenger traffic on the line from the Luxembourg station in Paris to Massy-Palaiseau (10½ miles) and the branch to Sceaux-Robinson has been electrically operated. The line was electrified by the P.O.-Midi Railway, who owned it, but it has now been transferred to the Paris Metro system.

Erie Railroad Bankruptcy.—The board of directors of the Erie Railroad Company on January 18 authorised the filing of a petition in bankruptcy for the company in the United States District Court. The Erie Company has a route mileage of 2,433. The Virginia Transportation Corporation (which is owned by the Chesapeake & Ohio Railway) and the Chesapeake & Ohio Railway have control, actual or potential, of 1,196,400 shares, or 56 per cent., of Erie preferred and Common stocks.

Address Changes.—The Publicity and Commercial Advertising Department of the G.W.R. is now situated in new premises at 14, Bishop's Bridge Road, Paddington, W.2. The telephone number remains at Paddington 7000. Sir John Wolfe Barry & Partners will remove during this month to 164, Grosvenor Gardens House, Grosvenor Gardens, S.W.1. The telephone number will be Victoria 6436-7, the new telegraph address "Consilium, Sowest, London," and the new telegraph address for Bengal-Nagpur Railway work "Nagpur, Sowest, London."

New Ticket Machine, L.P.T.B.—Beginning on April 2, Edgware Road (Metropolitan) station will be the first railway station in Britain to have no tickets printed in advance. All tickets will be printed as they are required on a new multi-unit machine of which preliminary tests have been made at Baker Street. The machine will provide not only for present needs, but also for the situation that will arise when the tube services are extended to some 50 main-line stations. Under the present system tickets for longer journeys are printed in advance on cardboard and are stocked in racks in the ticket office. The multi-unit machine enables 12 tickets a minute to be sold against eight manually, and does away with book-keeping. Instead of pre-printed tickets the clerk has at his hand a rack of small cylinders like organ stops. He

inserts the appropriate cylinder in the machine, which then prints and delivers either a first class, a third class, a workman's, or a return ticket for the desired amount. At the same time the sale of the ticket is registered automatically and a control strip records the total business done up to that time of day. The apparatus occupies little more space than a portable typewriter.

Argentine Railway Dispute Settled.—The dispute in which the Buenos Ayres Great Southern and Buenos Ayres Western railways recently became involved owing to the suspension of 190 members of their buffet staff in consequence of the reorganisation and modernisation of the service, was settled on January 18, according to a *Times* message. It was announced that by mutual agreement all suspended employees except 15 whose records are unfavourable would be reinstated.

Explosion in the Madrid Metro.—Confirmation is now to hand of the rumours regarding an explosion of a munitions dump in a tunnel of the Madrid Metropolitan. The disaster appears to have occurred on Monday, January 10, when, without warning, three explosions occurred, wrecking the houses above and causing a death roll which is variously estimated at 300 or 400. The tunnel where the explosion occurred is a branch of the underground Puerta del Sol-Ventas line. The branch runs from Goya station for about three-quarters of a mile through Lista station to Diego de Leon. Service was suspended in the branch at the end of 1936 and armed sentries have since guarded all entrances. The end near Goya was used as a munition factory and the terminus at Diego de Leon was the dump. When the explosion occurred, says a *Daily Telegraph* message, the blast of compressed air rushed down the main tunnel with such force that a train at the Banco de España station, over a mile distant, was picked up and turned over.

Kensington (Addison Road) Station Improvements.—As briefly recorded in our *Contracts and Tenders* pages this week, the L.M.S.R. and G.W.R. have announced that they are to spend approximately £35,000 on an extensive modernisation and improvement scheme for Kensington (Addison Road) station, of which, as partners in the West London Joint Railway, they are the proprietors. Whereas the number of passengers using this station is about 5,000 on an ordinary day, this rises to as high as 20,000 or 30,000 on days when exhibitions are being held at Olympia, which adjoins. The projected improvements will not only benefit passengers using the station, but will also make for a more rapid and efficient handling of the very large parcels traffic, which has steadily increased in recent years. The station buildings are to be reconstructed on modern lines throughout, whilst additional and extended awnings will be provided over the platforms; when the alterations have been carried out, the

way from the station into Olympia will also be completely covered. Awnings will be provided over the full width of the bay platforms used by Southern Railway and London Transport trains. New parcels offices will be provided on both sides of the station, that on the up, or delivery, side having berths for nine vehicles, and in addition there will be covered standing accommodation for 12 parcels vans. Office accommodation will be on a much larger scale and of up-to-date type. Passimeter-type booking offices will also be installed on both sides of the station. It has also been decided to alter the name of the station to Kensington (Olympia).

German Private Railways Association.—The 35th conference of the German Private and Light Railways Association was held at Frankfurt-on-Main on November 29 and 30, 1937, under the chairmanship of Herr Wehrspan, of Wanne, who, in his opening address, dwelt on the services rendered to the community by these lines and emphasised the spirit of initiative displayed by many, notably in the intro-

duction of diesel and other motor vehicles, in which they had anticipated the main lines. He also read a paper on education for posts in the traffic department of such concerns and outlined the methods now being pursued to effect an improvement in this important matter in association with the German Labour Front. Herr Köhler, of Cassel, spoke on superheated steam and modern high-pressure boilers. Herr Mayer, Essen, gave a paper on the characteristics of the latest types of points suitable for the private lines and the influence of traffic of different kinds on choice of equipment. Welding, both for vehicles and rails, was treated by Herren Buck, Nolten, and Brieger with film illustrations; and Herr Semke, of Berlin, read a paper on permanent way for narrow-gauge lines. The transport regulation and co-ordination plans, so vigorously elaborated and put in force by the present Government, have given an added sense of security to the private transport undertakings in Germany, and encouraged them to look more hopefully on the future and improve their property.

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices	
			Jan. 19, 1938	Rise/ Fall
G.W.R.				
Cons. Ord.	67½	55½	61½	—
5% Con. Prefce.	127	108	117½	—
5% Red. Pref. (1950) ..	113	109	110½	—
4% Deb.	113½	102½	109½	—
4½% Deb.	118	106	110½	—
4½% Deb.	124½	112	117½	—
5% Deb.	136½	122½	129½	+1
2½% Deb.	76	64	68½	—
5% Rt. Charge	1337½	118	126½	—
5% Cons. Guar.	133½	116½	127	—
L.M.S.R.				
Ord.	36½	25½	27½	—½
4% Prefce. (1923)	82½	65½	67	—1
4% Prefce.	92½	77½	80	—1
5% Red. Pref. (1955) ..	107½	102	103	—
4% Deb.	108	99½	104½	—
5% Red. Deb. (1952) ..	117½	111	113½	—
4% Guar.	104	95½	102	—
L.N.E.R.				
5% Pref. Ord.	12½	6½	8	—
Def. Ord.	6¼	3½	4	—½
4% First Prefce.	79½	63	65½	—½
4% Second Prefce.	31½	21	25	—1
5% Red. Pref. (1955) ..	101½	89½	96½	—
4% First Guar.	103	91½	95½*	—1
4% Second Guar.	97½	85½	89*	—½
3% Deb.	84½	74	79	—
4% Deb.	107½	98½	103½	—
5% Red. Deb. (1947) ..	113½	106½	110½	—
4½% Sinking Fund Red. Deb.	110½	105½	107	—
SOUTHERN				
Pref. Ord.	98½	83½	83½	—½
Def. Ord.	27½	16½	18½	—½
5% Pref.	126½	105½	114½	—
5% Red. Pref. (1964) ..	118	110½	113½	—
5% Guar. Prefce.	133½	116½	127	—
5% Red. Guar. Pref. (1957) ..	118½	111½	115	—
4% Deb.	112	101½	108	—
5% Deb.	135½	123½	127½	—
4% Red. Deb. 1962-67 ..	113	105	106½	—
BELFAST & C.D.				
Ord.	5	4	4½	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar.	105½	99	100½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	5½	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	22½	—½
Prefce.	61	34	33	—3
Guar.	94½	69½	67	—
Deb.	95	82½	82½	+1
L.P.T.B.				
4½% "A"	123½	110½	118½	—
5% "A"	135	121½	128½	+1
4½% "T.F.A."	108½	104	106	—
5% "B"	125	114½	120½	—
"C"	99½	75	79½	—
MERSEY				
Ord.	42½	22	20½	—1
4% Perp. Deb.	103	96½	100*	—1
3% Perp. Deb.	77½	74½	74½*	—1
3% Perp. Prefce.	68½	61½	64½	—2

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 2nd Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
L.M.S.R. (6,856 mls.)						
Passenger-train traffic...	379,000	367,000	+ 12,000	760,000	731,000	+ 29,000
Merchandise, &c. ...	483,000	476,000	+ 7,000	933,000	925,000	+ 8,000
Coal and coke ...	319,000	281,000	+ 38,000	620,000	558,000	+ 62,000
Goods-train traffic ...	802,000	757,000	+ 45,000	1,553,000	1,483,000	+ 70,000
Total receipts ...	1,181,000	1,124,000	+ 57,000	2,313,000	2,214,000	+ 99,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	254,000	250,000	+ 4,000	515,000	498,000	+ 17,000
Merchandise, &c. ...	332,000	323,000	+ 9,000	628,000	632,000	— 4,000
Coal and coke ...	289,000	269,000	+ 20,000	545,000	507,000	+ 38,000
Goods-train traffic ...	621,000	592,000	+ 29,000	1,173,000	1,139,000	+ 34,000
Total receipts ...	875,000	842,000	+ 33,000	1,688,000	1,637,000	+ 51,000
G.W.R. (3,739½ mls.)						
Passenger-train traffic...	163,000	171,000	— 8,000	329,000	334,000	— 5,000
Merchandise, &c. ...	195,000	185,000	+ 10,000	383,000	367,000	+ 16,000
Coal and coke ...	129,000	121,000	+ 8,000	252,000	238,000	+ 14,000
Goods-train traffic ...	324,000	306,000	+ 18,000	635,000	605,000	+ 30,000
Total receipts ...	487,000	477,000	+ 10,000	964,000	939,000	+ 25,000
(S.R. (2,147 mls.)						
Passenger-train traffic...	260,000	255,000	+ 5,000	523,000	507,000	+ 16,000
Merchandise, &c. ...	56,500	57,000	— 500	106,500	110,500	— 4,000
Coal and coke ...	38,500	36,000	+ 2,500	69,500	66,500	+ 3,000
Goods-train traffic ...	95,000	93,000	+ 2,000	176,000	177,000	— 1,000
Total receipts ...	355,000	348,000	+ 7,000	699,000	684,000	+ 15,000
Liverpool Overhead (6½ mls.)						
Mersey (4½ mls.) ...	4,574	4,443	+ 131	9,349	9,141	+ 208
*London Passenger Transport Board ...	566,100	550,900	+ 15,200	16,297,700	16,251,000	+ 46,700
IRELAND						
Belfast & C.D. pass. (80 mls.) ...	1,752	1,629	+ 123	3,533	3,296	+ 237
" " goods ...	437	447	— 10	777	838	— 61
" " total ...	2,189	2,076	+ 113	4,310	4,134	+ 176
Great Northern pass. (543 mls.) ...	8,100	7,400	+ 700	16,800	15,500	+ 1,300
" " goods ...	8,300	8,900	— 600	14,600	16,100	— 1,500
" " total ...	16,400	16,300	+ 100	31,400	31,600	— 200
Great Southern pass. (2,076 mls.) ...	28,956	27,099	+ 1,857	57,778	55,409	+ 2,369
" " goods ...	50,037	51,636	— 1,599	95,981	94,706	+ 1,275
" " total ...	78,993	78,735	+ 258	153,759	150,115	+ 3,644

* 29th week (before pooling)

* ex dividend.

CONTRACTS AND TENDERS

The L.M.S.R. and G.W.R. have announced that they are to spend approximately £35,000 on a reconstruction scheme for Kensington (Addison Road) station. Further details are given in our news notes on page 132.

Tank Locomotives for India

W. G. Bagnall Limited has received an order from the Mysore Railway for two 2-6-4 type side tank, 2 ft. 6 in. gauge, superheated locomotives, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

The Société Commercial D'Ougrée, of Ougrée, Belgium, has received an order from the Madras & Southern Mahratta Railway for 4,000 bearing plates to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

The Bengal & North Western Railway has placed an order with the Société des Ateliers Jules Empain, of Manage, Belgium, for 400 sets of screw coupling buffers, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Worthington Simpson Limited has received an order from the Buenos Ayres Great Southern Railway for 12 horizontal centrifugal pumps.

Vulcan Foundry Limited has received an order from the Rohilkund & Kumaon Railway for 10 locomotive boilers, BEFA 4-6-0 superheated type, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Henry Berry & Co. Ltd. has received an order from the Central Argentine Railway for one hydraulic spring plate forming machine and one hydraulic straightening press complete with accumulators and pumps.

According to a Reuters message the Algoma Steel Corporation of Sault Ste. Marie, Ontario, has received an order for 40,000 tons of steel rails from the South African Government. Deliveries, it is stated, are to start in June.

West's Rotinoff Piling & Construction Co. Ltd. has received a contract from the G.W.R. for the reconstruction of a bridge and retaining walls at Barry, Glamorgan.

The Roumanian State Railways have ordered 65 motor buses to operate the railway feeder services which the Government has recently conceded to them. German builders are reported to be supplying 25 vehicles (Bussings 15 and M.A.N. 10), Italian Fiat 5, Austrian Fiat 5, Saurer 15 and Chevrolet 15.

The Birmingham Railway Carriage and Wagon Co. Ltd., has received an order from the Leopoldina Railway for 16 wagon underframes.

The Monk Bridge Iron & Steel Co. Ltd. has received an order from the South Indian Railway for 244 locomotive tyres to be supplied to the inspection of Messrs. Robert White & Partners.

Kitchen & Wade Limited has received an order from the Central Argentine

Railway for one motor-driven radial drilling machine.

Thomas F. Johnson Limited has received an order from the South Indian Railway for 1,500 carriage door locks to be supplied to the inspection of Messrs. Robert White & Partners.

Howell & Co. Ltd. has received an order from the Peruvian Corporation Limited for 1,800 solid-drawn galvanised steel boiler tubes.

British Exports to Argentina

An analysis of Anglo-Argentine trade in 1937 shows that the principal British exports to this market have risen in value to £19,532,000 during the last twelve months, an increase of nearly 31 per cent. over 1936. Since 1932, when the Roca-Runciman trade agreement was concluded between the two countries, the increase in exports to Argentina has been 83 per cent. Iron and steel manufactures exported to Argentina have increased by 68.5 per cent. to £3,495,000 during the year. The increase since 1932 is 107 per cent. Shipments of coal rose by 22 per cent. to £2,194,000, a rise of 32 per cent. on 1932. An increase of £360,000 in the value of British vehicles and parts sent to Argentina is mainly accounted for by large deliveries of diesel railcars. The total of £1,019,000 shows an increase of more than 40 per cent. over the 1932 figures. British imports from Argentina during 1937 have risen in value to £59,473,000, an increase of 32.8 per cent. as compared with 1936.

Canadian Pacific Rolling Stock Programme

Some details are now available of the Canadian Pacific Railway rolling stock programme on which \$10,000,000 are to be expended. As a part of this programme the company has issued inquiries for tenders for 2,700 vehicles of different types. A locomotive building programme was also announced by the company, and inquiries were issued covering ten Hudson type locomotives. It is possible that inquiries covering additional locomotives will be issued later in the year. The proposed freight car programme is as follows: 2,000 forty-ton steel sheathed box cars; 200 twin hopper cars of 100,000 lb. capacity; 200 steel underframe stone cars 41 ft. 8 in. in length; 100 low-side drop-end gondola cars of 150,000 lb. capacity and 200 flat cars 46 ft. in length.

R. A. Lister & Co. Ltd. has received an order from the Buenos Ayres Great Southern Railway for a number of diesel engines including eight single and two twin cylinder automatic engines for pumping plant.

Leyland Motors Limited has received orders from the London Passenger Transport Board for 100 trolleybuses and from Hebble Motor Services Limited for one Tiger passenger vehicle.

Tenders are invited, receivable by the G.W.R., Paddington station, by January 27, for the reconstruction,

widening, and lengthening of a bridge carrying the Pontypridd to Caerphilly line over Treforest Road, Pontypridd, Glam.

Tenders are invited by the Madras & Southern Mahratta Railway for the supply of 1,561 cwt. of bright drawn steel bars for automatic machines.

Forthcoming Events

- Jan. 21 (Fri.).—Institute of Transport (East Midlands), at Guildhall, Nottingham, 7 p.m. "The Reason Chesterfield Corporation changed over from Trolleybuses to Oil Engine Buses," by Mr. R. Hoggard.
- Jan. 22 (Sat.).—Institute of Welding (South Wales), at Technical College, Newport, 7.30 p.m. "The Application of Surfacing Metals by Oxy-Acetylene," by Mr. C. Bainbridge.
- Permanent Way Institution (Exeter), at Mead Street Hall, Bristol, 2.45 p.m. "Permanent Way for High Speed," by Mr. W. A. Willox.
- Jan. 24 (Mon.).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. "A Tourist's Moving Picture Records of Holidays—Home and Abroad," by Mr. A. Lancaster.
- Stephenson Locomotive Society (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. "Timing and Locomotive Performance," by Mr. F. Plant.
- Jan. 25 (Tues.).—Federation of Railway Lecture and Debating Societies (N.E. Area), at Co-Operative Hall, Darlington, 7.30 p.m. Lecture by Mr. D. Handover.
- Institute of Transport (Birmingham Graduate), at Chamber of Commerce, New Street, 6.30 p.m. Short Papers.
- Permanent Way Institution (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. "Permanent Way Tools and Equipment," by Mr. E. Tustain.
- Jan. 26 (Wed.).—Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. "The Theory and Practice of the Locomotive Boiler," by Messrs. M. Loubser and E. Cox.
- Institution of Railway Signal Engineers, at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Signalling in New Zealand," by Mr. G. Wyles.
- Jan. 27 (Thurs.).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. "Air Raid Precautions and the Great Western Railway," by Mr. J. Webster.
- Institute of Welding (Leeds), at Griffin Hotel, 7.30 p.m. Debate: "Oxy-Acetylene and Electric Welding."
- Institution of Civil Engineers (Birmingham), at James Watt Inst., Great Charles Street, 6 p.m. "Construction of Permanent Way for High Speed Traffic," by Mr. H. Whitely.
- Institution of Mechanical Engineers (Southern), at University College, Southampton, 6.45 p.m. "The Early History of the Locomotive," by Prof. C. Bulleid.
- Jan. 28 (Fri.).—Institute of Transport (Manchester-Liverpool), at Central Library, Manchester, 6.30 p.m. "Advertising Transport," by Mr. K. Brady.
- Jan. 29 (Sat.).—Permanent Way Institution, at Inst. of Civil Engineers, Great George Street, London, S.W.1, 2.30 p.m. Winter Meeting. Annual Winter Dinner, at Charing Cross Station Hotel, 6.30 p.m.
- Feb. 17 (Thurs.).—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. Annual General Meeting. "Railways in Law: Grains of Railway History Gleaned from the Law Reports," Presidential Address by Mr. Kenneth Brown.

Forthcoming Meetings

- JAN. 25 (Tues.).—Bengal & North Western Railway Company (Ordinary General), Winchester House, Old Broad Street, E.C.1, at 12 noon.

OFFICIAL NOTICES

London and North Eastern Railway

NOTICE IS HEREBY GIVEN that the Directors have fixed 27th January, at the close of business, as the date for striking the Balances of the Company's Guaranteed, Preference and Ordinary Stocks. Final Dividends declared for the year ended 31st December, 1937, will be payable only to the Stockholders whose names are registered in the books of the Company on the date so fixed.

Deeds of Transfer should, therefore, be lodged with the Registrar of the Company at Hamilton Buildings, Liverpool Street Station, London, E.C.2, before 5.0 p.m. on 27th January.

By Order,

JAMES McLAREN,

Secretary.

Marylebone Station,
London, N.W.1.
17th January, 1938.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for:—

6,765 Lineal Yards SAIL CANVAS.

Specification and Form of Tender can be obtained from the Company's Offices, 123, Victoria Street, Westminster, London, S.W.1.

Fee ONE GUINEA, which will not be returned.

Tenders must be submitted not later than 2 o'clock p.m. on TUESDAY, 8th FEBRUARY, 1938.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,

G. W. V. DE RHE PHILIPPE,

Secretary.

No. 386,813. "An Improved Projecting Mirror."

THE owners of the above patent are desirous of arranging by licence or otherwise on reasonable terms for the manufacture and commercial development of the invention. For particulars address in the first instance to Herbert Hadden & Co., 31 and 32, Bedford Street, Strand, London, W.C.2.

Universal Directory of Railway Officials and Railway Year Book

43rd Annual Edition, 1937-38

Price 20/- net.

THE DIRECTORY PUBLISHING CO. LTD.
33, Tothill Street, Westminster, S.W.1.

RAILWAY AND OTHER REPORTS

White Pass & Yukon Railway.—

With a net profit of only £11 recorded for the financial year to June 30, 1937, the debit forward in the accounts of the White Pass & Yukon Railway Co. Ltd., which holds the securities of certain railways operating in Alaska, is now £270,004.

South Behar Railway.—

After paying the dividend at the rate of 5 per cent. per annum for the half-year ended December 31, 1936, a balance was brought forward of £5,376, which, with the amount received from the Secretary of State for India for the half-year to June 30, 1937, and other receipts, less interest on debenture stock and sundry other outgoings, left £14,906 to credit of revenue account. An interim dividend of 5 per cent. was paid on July 31, leaving £5,417 to carry forward. Adding £15,000 received from the Secretary of State for India for the half-year to December 31, 1937, and other receipts, less interest on debenture stock and other outgoings, there remains a balance of £14,982. The directors recommend a dividend at the rate of 5 per cent. per annum for the half year, which will absorb £9,490, leaving £5,493 to be carried forward.

Tilling & British Automobile Traction Limited.—

The directors recommend a dividend of 4 per cent. for the half-year ended December 31, 1937, and a further dividend of 2 per cent. for the year on the 8 per cent. participating preference shares (making a total of 10 per cent. for 1937, the same as for 1936); and a final dividend of 5 per cent. on the ordinary shares, making 10 per cent. for 1937. The dividend for 1936 was also 10 per cent. on the ordinary shares, but the payment for 1937 is on a capital increased by a 20 per cent. share bonus.

Leyland Motors Limited.—

A higher ordinary dividend, 25 per cent., is being paid for the year ended September 30, 1937. This compares with a dividend of 20 per cent. paid last year. General production increase, particularly of trolleybuses and fire engines, has resulted in gross trading profits of £746,951; net profits without allow-

ance for taxation and contingencies are £631,597. Corresponding figures for the previous year were £551,951 and £463,012. Allocation to general reserve

is unchanged at £150,000, whilst the carry forward is £86,819 or £35,000 higher than in the previous year. Every year since 1933 the company's profits have been increasing steadily, and this year's trading profit is the highest the company has ever made.

Staff and Labour Matters

Railway Shopmen—Industrial Court Decision

The Industrial Court sat on January 13 to hear the claim of labourer F. C. Mundy, Civil Engineering Department, West Ealing, Great Western Railway, for payment of 1s. 0d. a day meal allowance under Condition 9, Schedule F, of Industrial Court Decision No. 728, in respect of certain dates in the month of September, 1935, when he was employed as chainman at Twyford.

In support of the claim, the National Union of Railwaymen relied on the provisions of Condition 9 of Schedule F of Industrial Court Award No. 728, which is as follows:—

Men who are sent away from their home station, or district, and whose usual method of obtaining a mid-day meal is interfered with, shall be paid a meal allowance of 1s. 0d.

It was submitted that the workman concerned had on the material dates been sent away from his home station or district, viz., that covered by the West Ealing Inspector of Mechanics, also that his ordinary method of obtain-

ing a meal had been interfered with in that the time allowed for a meal had been reduced, and that in other respects facilities for getting or taking a meal were not available, and that accordingly the claim made was justified.

As against the claim it was submitted that the workman concerned was on the dates in question employed as a chainman and should accordingly be subject to the conditions of employment applicable to that grade. He had, in fact, been paid the rate appropriate to that grade, but had not been paid a meal allowance inasmuch as Twyford, the place at which he was employed on the dates in respect of which the claim was made, falls within the district covered by the London Divisional Engineer, on whose staff he had on those dates been employed as a chainman. He had not been sent away from his home station or district, and accordingly it was submitted that no meal allowance was payable.

By Decision No. 1,692, dated January 18, the Court found against the claim.

Exports of Railway Material from the U.K. in December

	Dec., 1937	Dec., 1936	Twelve Months Ending Dec., 1937	Dec., 1936
Locomotives, rail	228,688	103,601	1,130,637	1,303,438
Carriages and wagons	217,079	199,094	2,791,260	1,442,884
Rails, steel	163,799	192,958	1,453,073	1,295,579
Wheels, sleepers, fishplates and miscellaneous materials	175,806	111,730	1,417,815	1,457,737

Locomotive and rail exports included the following:—

	Locomotives		Rails	
	Dec., 1937	Dec., 1936	Dec., 1937	Dec., 1936
Argentina	5,329	3,689	8,599	3,013
Union of South Africa	—	—	33,896	165,084
British India	23,848	30,104	12,139	14,841

* Figures not available

Railway Share Market

Although still influenced by less encouraging dividend estimates, Home Railway stocks, apart from debentures and securities of the prior charge class, have again made lower prices this week. The traffic figures created a favourable impression, with the exception of those of the Great Western, the gain of £10,000 being below market expectations.

The lower prices of the junior stocks have probably arisen mainly from the uncertain trend of markets, which developed owing to the very small amount of business passing in all sections, with the exception of Gilt-edged securities.

Moreover, there is a general tendency to await the impending final dividend announcements, and it is possible that in the meantime quotations may not show much recovery, unless the trend of markets is definitely reversed. It is realised, however, that prices have now been reduced to levels at which quite

attractive potential yields are offered, even on the basis of the rather lower dividend estimates now current, reference to which was made last week.

L.M.S.R. ordinary changed hands around 27½ on Wednesday, and lower figures have also ruled for the 4 per cent. and 4 per cent. 1923 preference stocks at 80 and 67 respectively. Great Western, around 62, at which the stock is obtainable at the time of writing, would offer a favourable yield on a dividend of 3½ per cent., which continues to be anticipated by many market men. L.N.E.R. second preference was dull at 25, as was the 4 per cent. first preference at 66, although there is little doubt the cover for the dividend requirements of the last named stock has increased satisfactorily in the past year. Southern 5 per cent. preferred at around 84 gives a yield of 6 per cent., which would appear to be generous, bearing in mind there is every reason to expect the full divi-

dend will continue to be forthcoming so long as there is no serious set-back in general economic conditions. Southern deferred changed hands around 18½. A point of interest was a rather firmer tendency in London Transport "C" at 80, somewhat better demand being reported, pending the interim dividend announcement.

The general trend in foreign railway securities was again to lower prices. San Paulo at 52 was slightly better following the heavy decline on the Brazilian exchange situation. The company's 5 per cent. debentures also improved. Antofagasta ordinary rallied slightly, as did B.A. Pacific 5 per cent. debentures, but in other directions movements were adverse to holders. Market sentiment is affected by indications that, apart from the Argentine, there appears to be growing antagonism in the South American republics to foreign-owned enterprises. Canadian Pacific shares were lower at 7½.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1937-38	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date			Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1937		Totals		Increase or Decrease		Highest 1937	Lowest 1937	Jan. 19, 1938	Yield % (See Notes)			
						This Year	Last Year									
South & Central America	Antofagasta (Chili) & Bolivia	834	16.1.38	20,870	+	£ 3,710	3	£ 37,970	£ 3,710	+	£ 4,260	Ord. Stk.	29	101½	14	Nil
	Argentine North Eastern ..	753	15.1.38	10,093	+	1,706	29	277,558	263,380	+	14,178	"	191½	6	51½	Nil
	Argentine Transandine ..	—	—	—	—	—	—	—	—	—	—	A. Deb.	93½	60	80	5
	Bolivar	174	Dec., 1937	3,900	—	1,700	52	59,550	74,200	—	14,650	6 p.c. Deb.	91½	5	81½	Nil
	Brazil	—	—	—	—	—	—	—	—	—	—	Bonds.	17	9	111½	45½
	Buenos Ayres & Pacific ..	2,806	15.1.38	92,308	—	16,439	29	2,316,566	2,330,191	—	13,625	Ord. Stk.	171½	51½	6	Nil
	Buenos Ayres Central ..	190	1.1.38	992,500	—	\$13,900	27	\$3,421,890	\$3,836,606	—	\$381,860	Mt. Deb.	411½	18	171½	Nil
	Buenos Ayres Gt. Southern ..	5,084	15.1.38	204,404	+	1,985	29	3,795,843	3,580,415	+	215,428	Ord. Stk.	335½	131½	15	Nil
	Buenos Ayres Western ..	1,930	15.1.38	45,721	—	17,121	29	1,315,572	1,232,634	+	22,938	"	313½	111½	12	Nil
	Central Argentine	3,700	15.1.38	127,854	—	57,754	29	3,666,558	4,129,559	—	463,001	"	341½	104½	12	Nil
	Do.	—	—	—	—	—	—	—	—	—	—	Did.	201½	41½	6	Nil
	Cent. Uruguay of M. Video ..	980	8.1.38	17,798	+	396	28	470,336	466,051	+	4,285	Ord. Stk.	67½	2	21½	Nil
	Cordoba Central	1,218	15.1.38	24,880	—	9,927	29	870,500	942,980	—	72,480	Ord. Inc.	61½	11½	11½	Nil
	Costa Rica	188	Nov., 1937	22,336	+	2,744	22	123,362	91,581	+	31,781	Stk.	38	27	281½	7
	Dorada	70	Nov., 1937	15,800	+	1,000	48	170,100	156,500	+	13,600	1 Mt. Db.	107	106	107½	59½
	Entre Rios	810	15.1.38	21,217	+	4,336	29	408,081	376,223	+	31,363	Ord. Stk.	197½	6	5	Nil
	Great Western of Brazil ..	1,092	15.1.38	10,800	—	300	3	20,400	22,500	—	2,100	Ord. Sh.	3½	1g	3g	Nil
	International of Cl. Amer. ..	794	Nov., 1937	\$509,126	+	\$82,245	48	\$5,379,250	\$4,650,651	+	\$728,599	"	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	—	—	1st Pref.	2/	1/—	1/2	Nil
	La Guaira & Caracas	22½	Dec., 1937	4,890	—	1,335	52	61,575	56,700	+	4,875	Stk.	81½	6	81½	Nil
	Leopoldina	1,918	15.1.38	19,872	—	2,875	3	39,942	46,156	—	6,214	Ord. Stk.	91½	3	31½	Nil
Mexican	483	14.1.38	\$246,760	—	\$86,000	2	\$455,300	\$565,900	—	\$110,600	"	11½	1½	1½	Nil	
Midland of Uruguay	319	Dec., 1937	9,910	+	1,003	26	52,414	50,223	+	2,191	"	17½	2	12	Nil	
Nitrate	384	15.1.38	6,676	—	5	2	6,776	6,781	—	5	Ord. Sh.	31½	2	21½	Nil	
Paraguay Central	274	15.1.38	\$2,807,000	—	\$495,000	29	\$92,947,000	\$75,639,000	+	\$17,308,000	Pr. Li. Stk.	84	791½	771½	73½	
Peruvian Corporation	1,059	Dec., 1937	76,908	—	4,604	26	504,036	490,785	+	13,251	Pref.	145½	41½	5	Nil	
Salvador	100	8.1.38	\$29,000	—	\$2,750	28	\$417,375	\$417,508	—	\$133	Pr. Li. Db.	231½	21½	22½	Nil	
San Paulo	1534	9.1.38	26,829	—	3,443	2	32,323	36,505	—	4,082	Ord. Stk.	981½	56	52½	91½	
Taltal	160	Dec., 1937	6,186	+	2,095	26	22,535	21,900	+	1,635	Ord. Sh.	171½	111½	5½	135½	
United of Havana	1,353	8.1.38	19,709	+	3,324	28	462,430	443,299	+	19,131	Ord. Stk.	56g	31½	2	Nil	
Uruguay Northern	73	Dec., 1937	991	—	519	26	5,294	6,564	—	1,270	Deb. Stk.	10	2	31½	Nil	
Canada	Canadian National	23,803	14.1.38	613,483	—	36,341	2	1,157,435	1,232,920	—	75,485	"	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	—	—	4 p.c.	77	621½	691½	5½	
	Grand Trunk	—	—	—	—	—	—	—	—	—	4 p.c. Gar.	1017g	941½	100	4	
Canadian Pacific	17,186	14.1.38	472,200	+	6,600	2	929,800	914,200	+	15,600	Ord. Stk.	18	71½	71½	Nil	
India	Assam Bengal	1,329	10.12.37	35,715	—	2,423	36	942,783	905,828	+	36,951	Ord. Stk.	86	731½	81	311½
	Barsi Light	202	20.12.37	4,117	—	1,395	38	94,387	81,520	+	10,867	Ord. Sh.	861½	46	57	85½
	Bengal & North Western ..	2,107	31.12.37	84,660	—	5,635	13	682,732	693,914	—	11,182	Ord. Stk.	317	301	304	515½
	Bengal Doonars & Extension ..	161	21.12.37	3,430	—	252	38	108,419	97,567	+	10,852	"	100	84	861½	7
	Bengal-Nagpur	3,268	31.12.37	213,900	—	60,100	39	5,146,024	4,518,097	+	627,927	"	101	89	901½	471½
	Bombay, Baroda & Cl. India ..	3,072	10.1.38	249,300	—	48,675	41	6,781,425	6,590,175	+	191,250	"	113	1101½	1111½	53½
	Madras & Southern Mahratta ..	3,229	31.12.37	181,975	—	28,396	30	4,109,159	4,118,779	—	9,620	"	110	105	107½	715½
	Rohilkund & Kumaon	572	31.12.37	16,526	—	3,024	13	117,677	124,451	—	6,774	"	314	302	308	515½
South Indian	2,531½	20.12.37	119,581	+	14,398	38	2,990,652	2,870,058	+	110,594	"	1031½	991½	1001½	45½	
Various	Beira-Umtali	204	Nov., 1937	90,637	+	21,848	9	186,351	137,294	+	49,057	"	—	—	—	—
	Egyptian Delta	620	10.12.37	7,900	—	311	36	183,881	174,138	+	9,743	Prf. Sh.	31/—	5½	11½	Nil
	Great Southern of Spain ..	—	—	—	—	—	—	—	—	—	Inc. Deb.	31½	3g	31½	Nil	
	Kenya & Uganda	1,625	Dec., 1937	195,953	—	9,301	52	2,710,000	2,527,158	+	182,842	"	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	—	B. Deb.	481g	431½	451½	85½	
	Midland of W. Australia ..	277	Nov., 1937	14,455	+	1,259	22	69,130	67,251	+	1,879	Inc. Deb.	98	931½	931½	41½
	Nigerian	1,900	4.12.37	75,565	—	10,380	36	1,801,390	1,425,326	+	375,974	"	—	—	—	—
	Rhodesia	2,451	Nov., 1937	428,233	—	94,574	9	895,596	688,890	+	206,706	"	—	—	—	—
	South Africa	13,263	25.12.37	680,043	+	51,163	39	25,050,223	23,593,175	+	1,457,048	"	—	—	—	—
	Victoria	4,774	June, 1937	793,223	—	89,530	52	10,135,291	9,689,925	+	445,366	"	—	—	—	—
Zafra & Huelva	112	Sept., 1937	15,307	+	8,641	39	117,046	65,948	+	51,098	"	—	—	—	—	

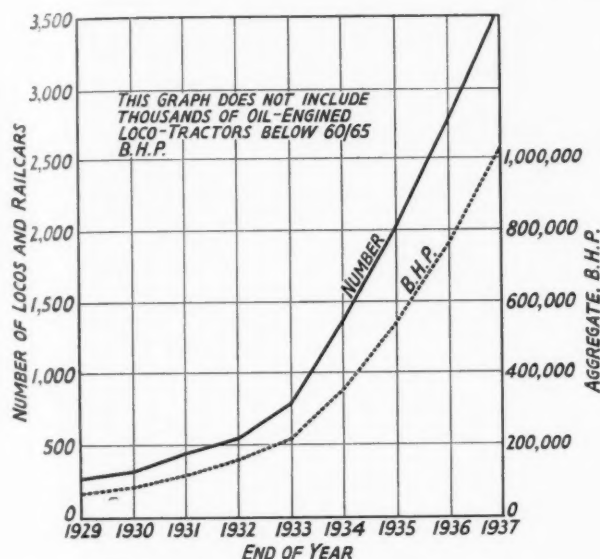
NOTE.—Yields are based on the approximate current prices and are within a fraction of 1g.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.

Diesel Railway Traction

Big Orders Will Follow World-Wide Satisfaction



Graph showing the number of railway-owned oil-engined vehicles of 65 b.h.p. or over

IT might be said that the accompanying graph showing the rate of progress of diesel traction during the last decade speaks for itself, and, indeed, there seems no reason to suppose that the constant rate of expansion of diesel services is likely to be decelerated. Rather does every factor point to its being increased. The tremendous volume of diesel work now being carried through in England and elsewhere for South America is in itself sufficient to assure the sceptical that oil-engined traction is all that it is normally claimed to be. And this activity in South America is by no means isolated. The development in Europe continues apace much as it has done during the past three years, but healthy signs are not wanting that railcar operation is on the threshold of a great advance in India, Australasia, and Africa. Railways which have used or have ordered diesel cars appear to be under no misapprehension as to the excellent service which can be given by such vehicles, as the following comments show.

From the Annual Report of the Victorian Railways Commissioners, 1936-37.—As a result of experience gained with compression-ignition engines in rail motor cars, a further five single-ended cars and one double-ended car were fitted with this type of engine. Anticipated economies have been fully realised. It is also proposed to place a diesel-electric shunting locomotive in service in Melbourne Yard in the near future.

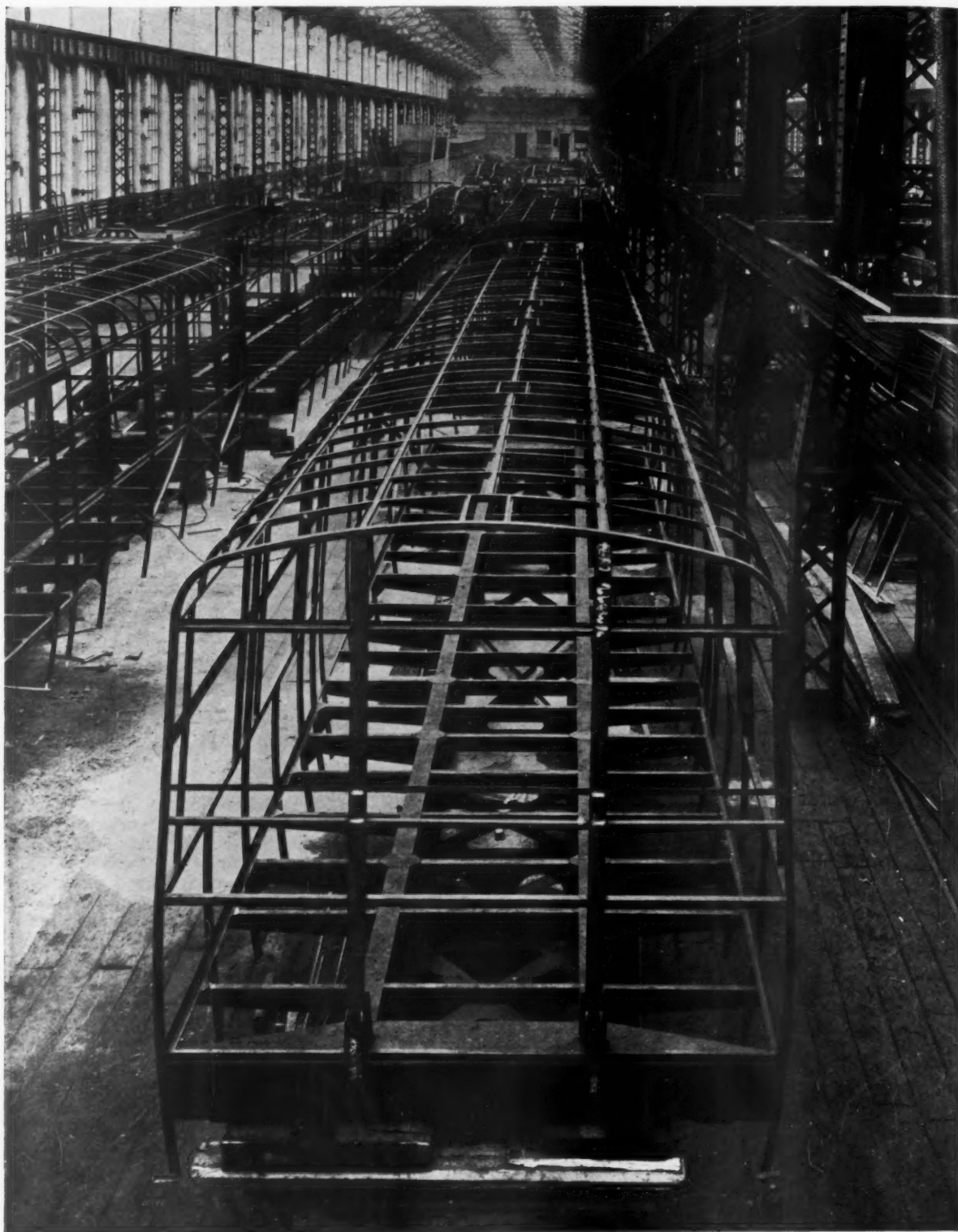
From the Annual Report of the Queensland Commissioner for Railways, 1936-37.—The results of operation of the diesel motor trains now in service have been such as to induce the purchase of an additional 17 engines of this type, of which seven are of 45 b.h.p. and ten of 102 b.h.p. A commencement is being made to replace petrol engines [in the older cars] with diesel-type units of similar horsepower. As the cost of fuel for the operation of diesel engines is considerably lower than for petrol engines, the change-over will effect a substantial reduction in operating costs. Four new diesel 102 b.h.p. streamlined motor trains of improved design are at present in course of construction.

From the Annual Report of the General Manager of the South African Railways & Harbours, 1936-37.—Following on investigations conducted overseas into the feasibility of introducing diesel-engined railcars on the South African Railways, the administration has decided to acquire 12 vehicles of this type. [Tenders have to be in by February 14.—ED.] The cars are to be designed to permit of them being used on sections laid with 60 lb. rails, and they will have separate accommodation for first class European, first class non-European, and third class native passengers.

From the Annual Report of the Buenos Ayres Great Southern Railway, 1936-37.—Every effort is being made to improve our local services, and the advent of the new diesel coaches should enable us to give increased facilities to the travelling public in the outer suburban regions where road competition has been strongly felt. Our experiment in running a railcar service between Cañuelas and Lobos at a reduced one-class fare has eliminated motor bus competition between these two towns. This is a good augury for the future, for when we are in a position to provide more services of this nature by the use of the diesel railcars now on order, we should have every hope of meeting this competition in a satisfactory manner.

From the Annual Report of the Buenos Ayres Western Railway, 1936-37.—With the object of combating road competition, one class diesel railcar services were instituted between Lincoln and Bragado and Lincoln and Villegas. The Lincoln-Bragado service has given fairly good results, as an omnibus service between Lincoln and Los Toldos has suspended service. The evening diesel railcar service to Pehuajo has also been successful in recapturing traffic. The Once—Pehuajo diesel railcar service ran throughout the year with great success.

From the Annual Report of the Entre Rios Railways, 1936-37.—The first of the [11] diesel coaches was placed in service between Nogoya and Parana on May 10, and although the section on which it runs is also served by various road omnibuses, the number of passengers travelling by the coach has demonstrated that we have gained many newcomers to the rail route.



A view of the erecting shop at the Strand Road, Preston, works of the English Electric Co. Ltd., showing under construction the welded steel body-underframe structures of the 12 cars of the diesel-electric trains for the Ceylon Government Railways

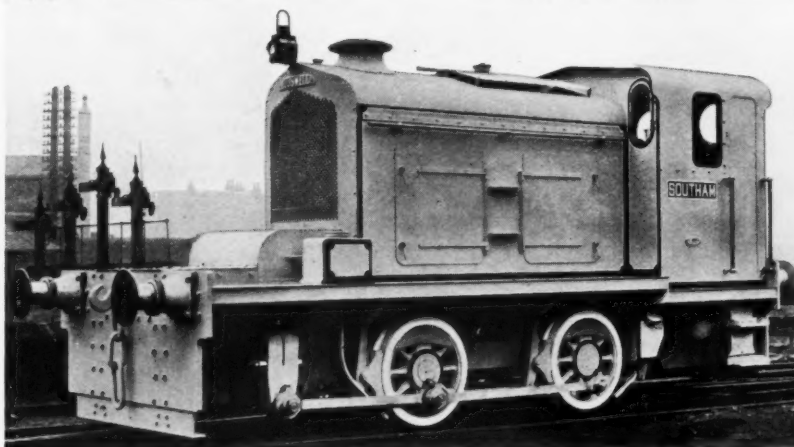
OIL ENGINE TRACTION IN THE BRITISH ISLES

Slow progress on home railways countered by increasing demand for industrial diesel locomotives

THE only diesel delivery in 1937 exceeding one vehicle to railways in the British Isles was that of three shunting locomotives to the Southern Railway, as described in the issue of this Supplement for December 24. Fortunately, the position was redeemed somewhat by the activity of the private builders in supplying industrial locomotives for home markets and railcars and locomotives for export all over the world.

Early in the year the Great Western Railway put into traffic on the Lambourn Valley branch the last of its A.E.C. railcars, and in contradistinction to the preceding 17 cars, it is used for trailer haulage. The Great Northern Railway of Ireland introduced more of its four-wheeled pneumatic-tyred railbuses, powered by Gardner 68 b.h.p. oil engines, and the Belfast & County Down Railway acquired a double-bogie 500 b.h.p. oil-electric locomotive from Harland & Wolff Ltd. for operation on the Ardglass branch. Working in co-operation, Metro-Vick and Met-Cammell built a 275 b.h.p. diesel-mechanical car of the Ganz type, suitable for speeds up to 75 m.p.h.

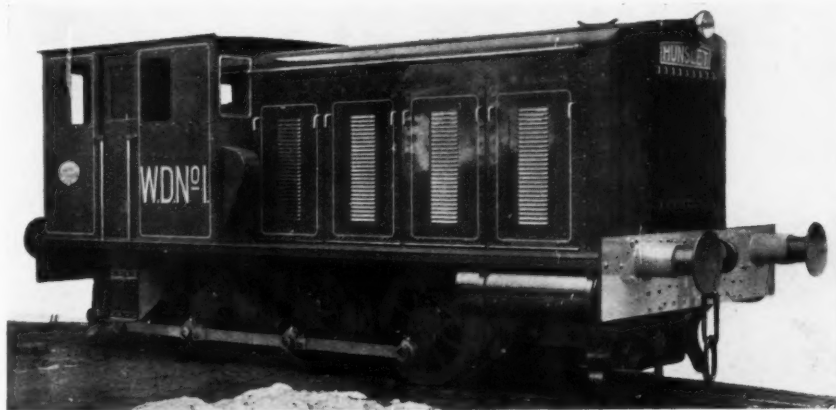
A number of shunting locomotives up to 200 b.h.p.—all with mechanical transmission—was built by various firms including two with 150 b.h.p. Gleniffer engines for the Air Ministry, two with 150 b.h.p. Gardner engines for the War Office, and one with a 180 b.h.p. Paxman-Ricardo engine for the Nobel explosives works, all five being built by Barclay. Hudswell Clarke completed a number of small diesel locomotives, and a 200 b.h.p. Gardner-engined unit for Llandarcy Refinery in South Wales. As this locomotive works in danger zones it is fitted with spark-proof equipment to the engine exhaust, and has tyre-washing gear to prevent sparks from the



Hudswell-Clarke 150 b.h.p. diesel shunting locomotive

wheels. The drive is through a Vulcan-Sinclair fluid coupling to a three-speed gearbox giving track speeds of 3, 5, and 9 m.p.h., and gear-changing is by a preselective tele-change method.

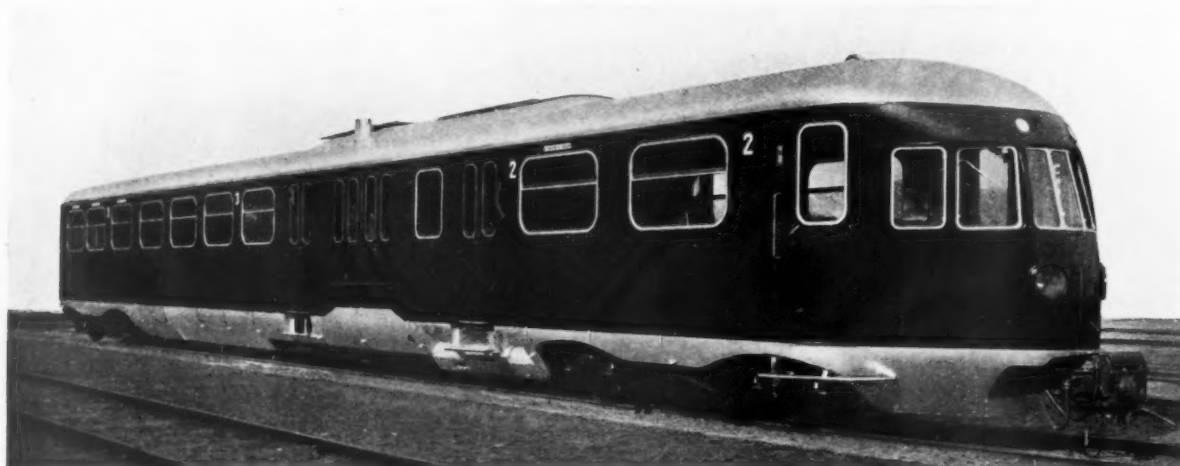
Two other interesting locomotives were the Stephenson-Hawthorn locomotive with a direct-reversing 110 b.h.p. Crossley oil engine (see issue of this Supplement for November 26) and the Hunslet 200 b.h.p. Gardner-engined locomotive for surface and underground operation at a War Office depot. Built to an extremely low loading gauge, the War Office locomotive is provided with the Hunslet exhaust gas conditioner, the 8L3 Gardner engine is mounted beneath a bonnet, and the circulating water is cooled in a Serck sectional radiator, containing also oil-cooling elements, under thermostatic control. There is a hot-water radiator in the cab. The drive is taken to a Hunslet friction clutch, flexible coupling and a three-speed gearbox with casing of welded steel. Westinghouse straight air brakes with self-lapping control are fitted, and the air is provided by a belt-driven Broom & Wade compressor. There is a double-pedal control, one for the left foot and one for the right, for running operations. The electrical equipment comprises a charging dynamo, batteries, head and tail lamps, cab and instrument lamps, and two engine starters, all supplied by C.A.V.-Bosch Ltd. The weight is 22 tons, and the maximum speed 18 m.p.h.



Hunslet 200 b.h.p. locomotive for absolutely flame-proof operation in a zone largely underground. The Hunslet patent exhaust conditioners can be seen below the buffer beam. The locomotive operates on a standard-gauge track belonging to the War Office. A load of 580 tons can be started and hauled in first gear at 6 m.p.h. on level tracks

LARGE-SCALE PROGRAMMES ON THE CONTINENT

Single orders of 30 to 100 cars are a feature of diesel developments in Europe



Twin-engined 300 b.h.p. diesel car with Mylius mechanical transmission, Netherlands Railways

IN addition to Roumania, the developments in which country are described elsewhere in this issue, three countries—France, Germany, and Italy—proceeded with big railcar programmes, and there was general railcar activity in other countries as well as something of a minor revival in diesel locomotive interest. Another feature of the year was the continued expansion in the use of high-speed train sets.

A great variety of railcar makes was put into traffic on the six big French railways (now fused in a national system) during 1937, but the majority of vehicles were either of the Renault or the standard types, of 300 to 600 b.h.p., and over 60 cars to these two designs were

introduced. The 600 b.h.p. cars have two engines, but Renault also built single-unit cars with one 16-cylinder 500 b.h.p. engine. Single-unit cars of Decauville make with two 300 b.h.p. Saurer engines were ordered by the P.L.M. Railway to supplement the cars of the same type already at work in the Savoy Alps. Renault supplied three twin-articulated sets with two 265 b.h.p. engines to the P.O.-Midi system, where they work on the long cross-country route from Bordeaux to Clermont-Ferrand. The miscellaneous makes included 300 b.h.p. De Dietrich cars on the Etat and Est systems, 350 b.h.p. supercharged Somua cars on the P.L.M., and a couple of 550 b.h.p. oil-electric Corpet Louvet cars on the Etat.



One of the 100 Fiat twin-engined cars with multiple-unit control now being delivered to the Italian State Railways

Early in the year the Nord began in conjunction with the Belgian National Railways the Paris-Brussels and Paris-Liège fast services, using the Nord's 820 b.h.p. triple-car rakes with Maybach engines, and the Est introduced mile-a-minute railcar runs from Paris to Nancy and Charleville, and an accelerated service from Nancy to Belfort, using the De Dietrich and Renault cars. An event of the year was the completion of the first of the P.L.M.'s two 4,400 b.h.p. oil-electric locomotives, and trial runs and services were made with it over a period of several months.

The German construction programme of 1937 included high-speed trains, big double-bogie cars, and light four-wheeled vehicles extending over a power range of 1,450 to 150 b.h.p. The first of the four-car trains, powered by a frame-mounted M.A.N. engine of 1,300 b.h.p., was delivered, but under construction also are 14 three-car trains with two 600 b.h.p. Maybach engines fitted with Büchi superchargers. A particularly interesting feature of the Reichsbahn's bogie railcar programme was the extensive use of Voith hydraulic transmission in conjunction with M.A.N. vertical engines of 360 and 420 b.h.p. and with the standard horizontal engine of 275 b.h.p., to a total of 50 vehicles. The use of this drive on the smaller cars, from 150 to 225 b.h.p., and on the loco-tractors of 50 to 75 b.h.p. also has been greatly extended by the Reichsbahn. The Berliner Maschinenbau A.G. has delivered or has under construction for a variety of customers 18 diesel locomotives of 300 to 360 b.h.p. and these also incorporate Voith hydraulic transmission.

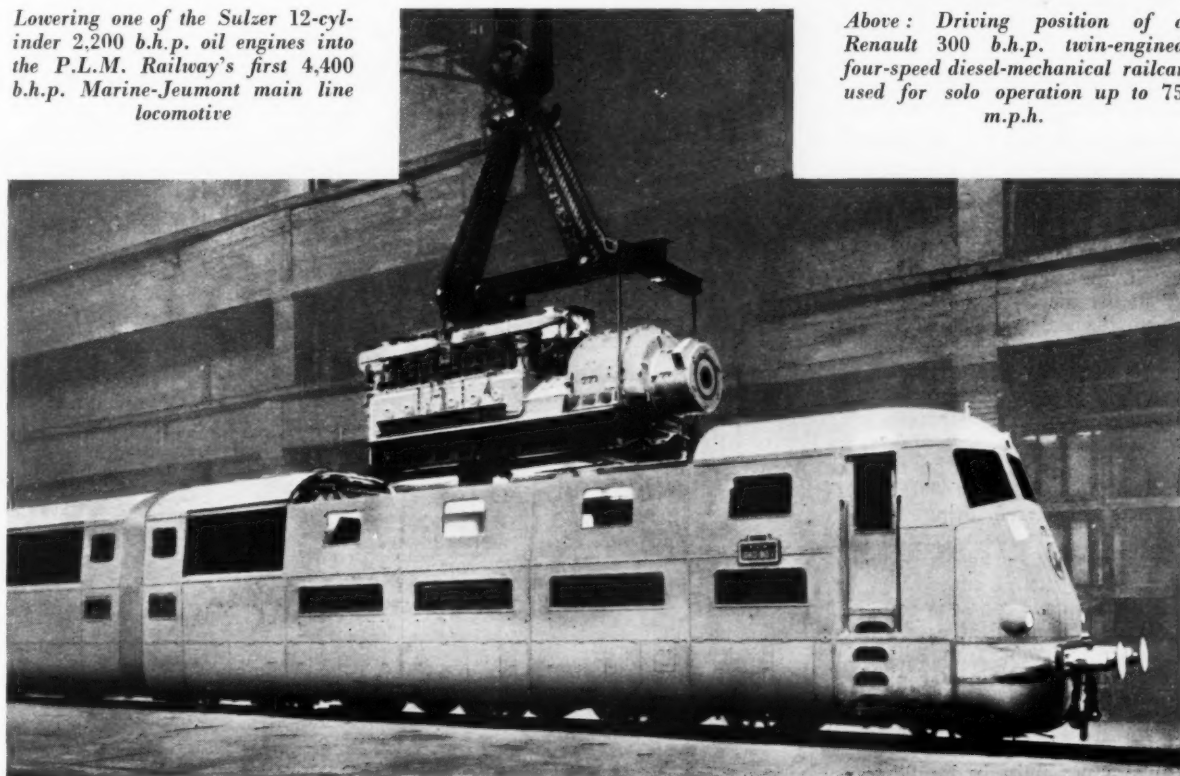
In Italy the State Railways have concentrated on two types of car, both double-engined, viz. the Fiat 290 b.h.p. *Littorinas* and the Breda 260 b.h.p. model with A.E.C.-type engines, Wilson-type gearboxes and Vulcan-Sinclair fluid couplings. Multiple-unit control is now considered as standard. Orders for 100 Fiat and 80 Breda cars are in course of delivery, the Fiat order being the second for

100 vehicles which has been placed with that builder. Other European activity included four 1,100 b.h.p. *Lyntog* four-car trains set to work on the Danish State Railways; eight 300 b.h.p. cars on the Netherlands Railways; several double-engined 300 b.h.p. cars for the Polish State Railways; and a variety of cars up to 400 b.h.p. on the Czechoslovak State Railways. Some new 360 b.h.p. 80-seater 28-ton railcars were delivered to the Norwegian State Railways for trailer haulage between Trondheim and Grong. They are powered by two D.W.K. horizontal engines of 180 b.h.p. and have hydraulic transmission. The framing is mainly of duralumin and the car weight is 28 tons; the cost was £10,000 a car.



Above: Driving position of a Renault 300 b.h.p. twin-engined four-speed diesel-mechanical railcar used for solo operation up to 75 m.p.h.

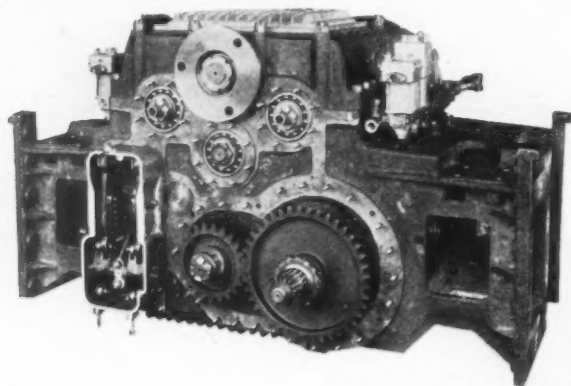
Lowering one of the Sulzer 12-cylinder 2,200 b.h.p. oil engines into the P.L.M. Railway's first 4,400 b.h.p. Marine-Jeumont main line locomotive



TRANSMISSIONS

A record of interesting developments in mechanical and hydraulic transmissions and in multiple-unit control

ALTHOUGH electric transmission is holding its own in the diesel locomotive sphere there is increasing evidence that for railcars electric transmission is likely to become a thing of the past, and even in high-speed train work, hitherto a field almost exclusively oil-electric, mechanical and hydraulic drives are creeping in, first with the two 1,200 b.h.p. diesel-hydraulic trains built for the Reichsbahn in 1936; then with the Italian three-car trains some of which have Fiat gearboxes and one a Cotal box; then the Renault 550 b.h.p. and 1,000 b.h.p. trains with Renault gearboxes, and finally with the high-speed trains and cars being built for the Est and Etat sections of the French National Railways, which are to have Mylius gearboxes. The advance of mechanical trans-

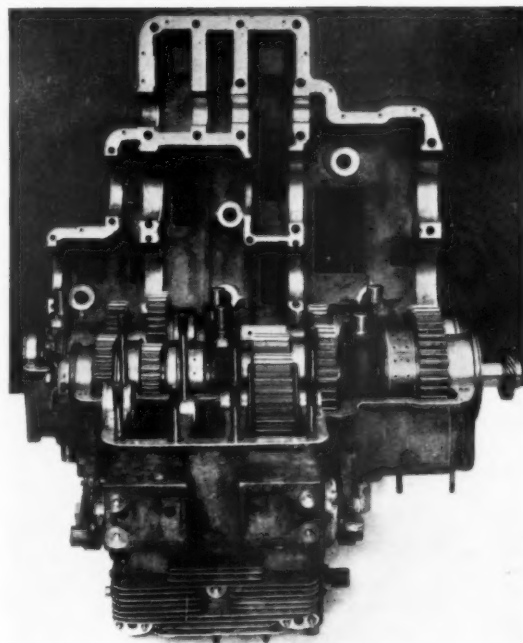


General view of Minerva pre-synchronising gearbox, showing declutching cylinders and their electrovalves

missions was paralleled, but to a lesser degree, by progress in the adoption of hydraulic transmission, more particularly in the medium power range of 275 to 425 b.h.p., but one of the most noteworthy applications of the year was on the Belgian National Railways, where 12 sets of Voith-Maybach gear are to be installed in six triple-car high-speed trains each driven by two 600 b.h.p. Maybach engines, this being a complete reversal of previous practice in Belgium, as the previous high-speed sets all have electric transmission.

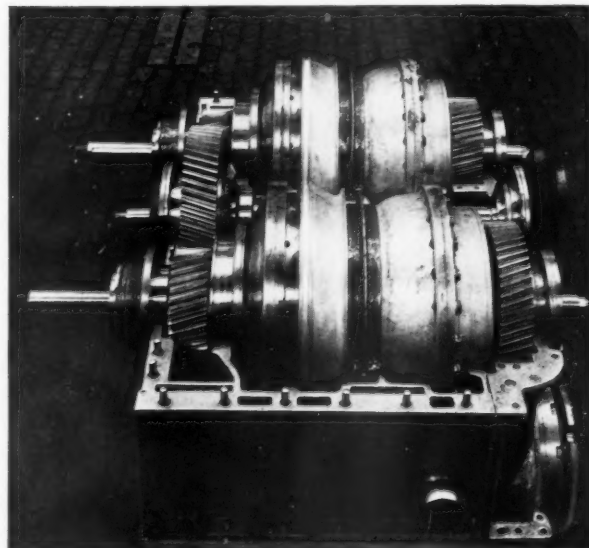
Electric drive is used on the most powerful European diesel locomotive, the first P.L.M. 4,400 b.h.p. unit, the system incorporated being the Jeumont, in which the excitation of the main generators is effected from axle-driven dynamos. The six 590 h.p. traction motors produce a total tractive effort of 46,250 lb. up to 24 m.p.h., and the one-hour rating is equivalent to 24,200 lb. at 54 m.p.h. The control gives engine speeds of 400 (idling), 500, 600, and 700 r.p.m. Electric transmission is being used also for the 14 new triple-car 1,200 b.h.p. and two four-car 1,450 b.h.p. trains of the Reichsbahn, and has been incorporated also in the Ceylon trains built by the English Electric Co. Ltd.

In size per unit, hydraulic transmission made no ad-



Metro-Vick-Ganz five-speed gearbox for use with 275 b.h.p. engine running at 1,450 r.p.m.

vance in 1937, and the highest power vehicle is still the 1,450 b.h.p. locomotive of the German State Railway. The Lysholm-Smith torque converter system as built by Leyland, Variable Speed Gear Ltd., and Krupp, is still used only for small high speed engines of 90 to 130 b.h.p. and its small bulk enables the complete power transmission equipment to be mounted in a confined space. There are now 66 Leyland-built sets at work or on order, including the six sets being incorporated in the L.M.S.R. six-engined triple-car train. Trials with the Lysholm-Smith system are being made in Czechoslovakia.

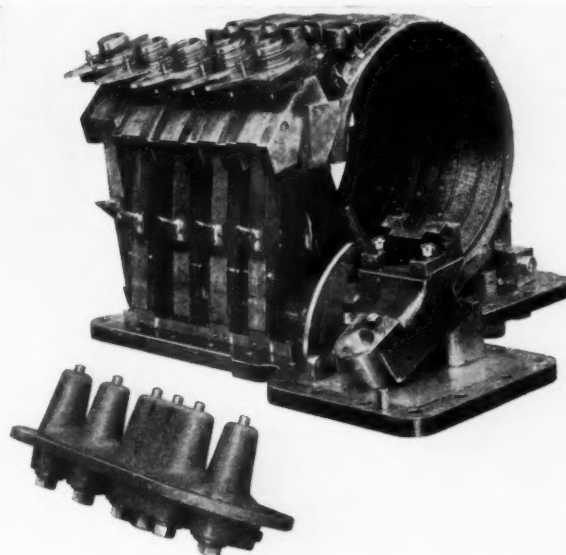


Voith double turbo hydraulic drive as used for 400 b.h.p. engines running at 1,400 r.p.m. and for 600 b.h.p. when step-up gears are used

At the end of 1937 there were 296 sets of Voith or Voith-Sinclair turbo transmissions at work in, or on order for, railcars and trains and 103 sets in locomotives and loco-tractors, the aggregate horse-power being 103,000. Although important converter deliveries for railcars were effected in 1937, *e.g.*, the 10 sets for the New South Wales Railways trains, 40 sets to go with 225 b.h.p. Maybach and M.A.N. engines in Germany, and 30 sets for 400 to 425 b.h.p. engines, it was perhaps in its application to locomotives that the Voith type of hydraulic drive made most progress in 1937, for almost 40 sets were delivered for use in conjunction with relatively slow-speed engines of 300 to 360 b.h.p., and 45 sets for engines of 65 to 240 b.h.p. It is now common practice for step-up gears to be interposed between the engine and converter in order to increase the speed of the impeller and thus reduce the size of the transmission unit.

In so far as British and British-controlled conditions are concerned the combination of a Wilson preselective epicyclic gearbox and a Vulcan-Sinclair fluid coupling can still be regarded as a standard transmission, and is used in powers up to 275 b.h.p. at 1,150 r.p.m. Its principal use is in conjunction with the Gardner engine of 100 b.h.p. running at 1,700 r.p.m., and over 150 of such sets were delivered or on order in 1937 in addition to boxes for other railcars and for heavy shunting locomotives up to 180 b.h.p. The Wilson box also is made in large numbers under licence by Breda for installation in railcars for the Italian State Railways, and trials with British-built boxes to suit 220 b.h.p. engines running at 1,400 r.p.m. are to be made by the Czechoslovak State Railways. Here again, Vulcan-Sinclair fluid couplings are to be used.

One of the best-known of all foreign gearboxes is the

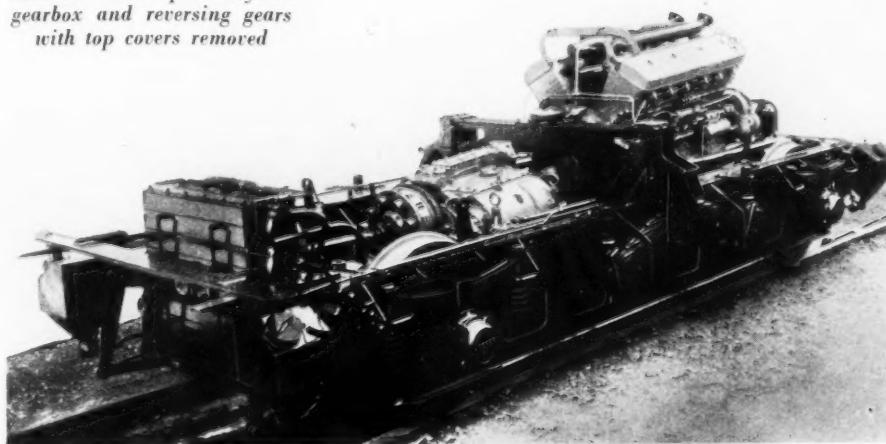


Brake-band assembly and side cover for air selection of Wilson-Drewry four-speed epicyclic gearbox



Above: Four-speed Mylius gearbox and reversing gears with top covers removed

Mylius, a full description of the latest high-power type of which was given in the issue of this Supplement for July 9, 1937. There are now over 800 of these boxes at work or on order in powers from 55 to 400 b.h.p., and spread over 19 different countries, and within recent months there has been a decided tendency to use it for engines of 250 b.h.p. and over, both in single-unit cars and in train sets. A neat solution of either way drive from the gearbox enables it to be used with bogie-mounted engines of high capacity. A multi-plate friction main clutch is used and preselective synchronised gear-changing is effected pneumatically through the medium of cone clutches. Several applications have been made recently of a special type of Mylius outside drive from the usual Mylius gearbox, the torque being transmitted to the axle outside the wheels, as illustrated in the article on the Lübeck-Büchen Railway cars in the May 14, 1937, issue of this Supplement. The Ardel box, another gear of German origin, was extended in its railway applications to several small locomotives and to a bogie car on the Niederbarnimer Railway powered by two 150 b.h.p. engines. The feature of the Ardel box is that a determined effort has been made to eliminate the drop in tractive

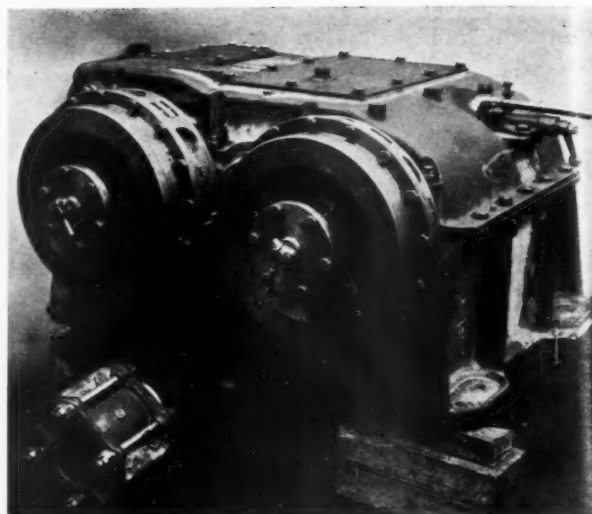


Five-speed Mylius gearbox, and reversing gear with double-axle drive as mounted in welded steel bogie of Reichsbahn railcar along with 330 b.h.p. Daimler-Benz engine running at 1,500 r.p.m.

effort during gear changes. Yet another German box, the T.A.G., has been widely used in Europe for outputs up to 300 b.h.p., and here again some of the recent developments have been along the lines of providing a neat double-end drive from boxes mounted on bogies. The normal four-speed box has two outer clutches and a double inner clutch. (See issue of this Supplement for March 19, 1937.)

Vulcan-Sinclair fluid couplings are being incorporated in the 12 new 720 b.h.p. twin-car trains and the six 380 b.h.p. railcars just ordered by the Belgian National Railways. Carels-Ganz engines are being used in these trains and the fluid coupling will go between the engine and an S.L.M.-Winterthur oil-operated gearbox. This is the first use of the Ganz engine with a fluid coupling. S.L.M.-Winterthur gearboxes are being used also in all the French standard cars, and there is a box of this type to transmit 500 b.h.p. at 1,500 r.p.m. Two eight-speed Cotal electro-magnetic epicyclic gearboxes are now being tried on one of the triple-car high-speed trains of the Italian State Railways; each box transmits the torque of a Fiat engine developing 450 b.h.p. at 1,500 r.p.m. and 550 b.h.p. at 1,800 r.p.m. and weighs 1,630 lb. with its bronze casing. In France, Corsica, and other French spheres a number of Minerva gearboxes with pneumatic servo control and multiple-unit coupling have been applied during 1937, and those used on the Charentaise railcars of the French State Railways are shown in an accompanying illustration; they give six speeds up to 75 m.p.h.

Where the gearbox used does not incorporate the reversing gear, it has become a not uncommon practice during the past twelve months in England to fit a Bostock & Bramley combined forward and reverse box, often in combination with the same maker's enveloping worm final drive, and two typical installations of the year were in the eleven double-engined Birmingham cars sent to the Entre Rios Railway and the two Gleniffer-engined Barclay locomotives for the Air Ministry. The unit consists of

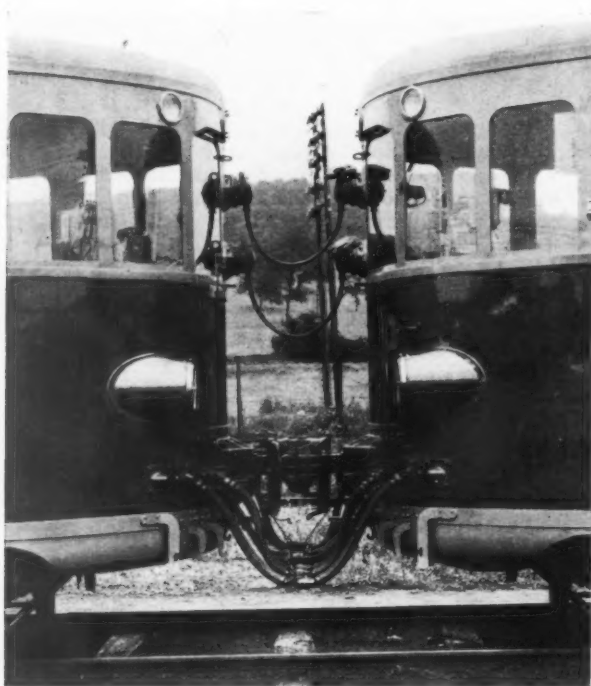


T.A.G. four-speed gearbox with double-end drive for mounting on bogies

a driving shaft on which are mounted the gears required for the correct direction of rotation of the rear wheels and worm shaft. Below the worm is the worm wheel, mounted directly on the axle. Two electro-pneumatic valves are located on the casing, and their pistons actuate gear-shifting levers which bring into mesh the particular gear required.

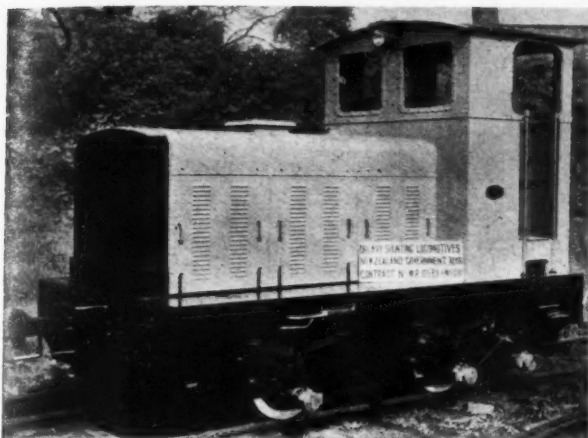
Considerable progress has been made in recent times in the direction of the remote control of engines and mechanical transmissions, and developments have worked upwards from the simple control of one engine and one box from either end of a single car to the operation in full multiple-unit of three or more cars, each with two engines and two gearboxes. The Ganz system (see issue of this Supplement for November 27, 1936) is well known, and a good deal of experience has been gained with it. In November last three of the 240 b.h.p. Ganz-type cars on the Buenos Ayres Pacific Railway ran for 660 miles at high speed while coupled in multiple-unit. Another form of multiple-unit control is being applied to all the new Fiat and Breda railcars on the Italian State Railways (and they are all double-engined), and the special inter-car coupling used can be seen in the illustration of the Fiat *Littorina* reproduced in the section of this Supplement dealing with progress in Europe. A simple and efficacious system of multiple-unit control also is available for Mylius gearboxes.

An electro-pneumatic system of control has been evolved by De Dietrich, and applied by that firm to various vehicles built by it and having the Mylius type of gearbox. For the selection of the different speeds the control is pneumatic, through the action of electro-magnetic valves which can be controlled from each driving position by a rotary valve with five passages; the clutch control also is electro-pneumatic, and the control of the reversing gear and the engine injection system are fully pneumatic. The coupling of two or three cars in multiple-unit can be done in three minutes and uncoupling in 2½ minutes. In the illustration of the De Dietrich inter-car coupling arrangement on this page, the two upper jumper connections are for the auxiliary electric circuits including the control of engine water and oil temperatures; of the lower flexible connections, three sets are for the brakes, and four are for the engine control, clutch operation, and reversing circuits.



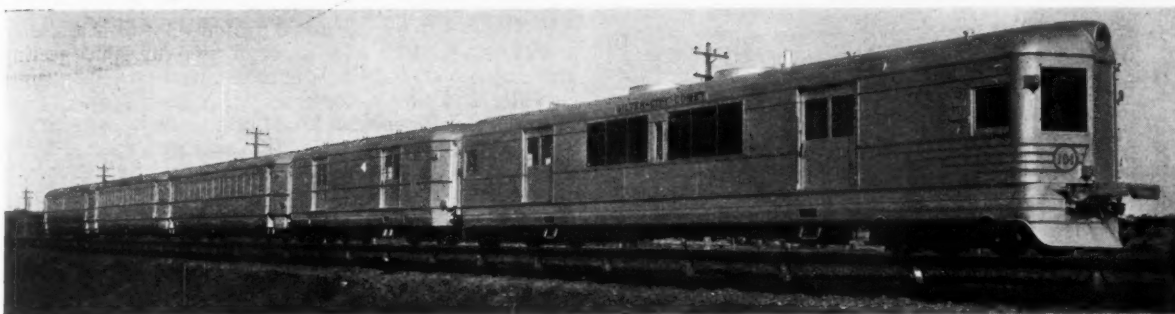
Centre coupler and connections for multiple-unit working, De Dietrich double-engined diesel-mechanical railcars

A RECORD OF PROGRESS IN AUSTRALASIA



Left: 75 b.h.p. Drewry locomotive with mechanical transmission for New Zealand. It is of a type used successfully in many parts of the world, and standard components are a Vulcan-Sinclair fluid coupling and a Wilson preselective epicyclic gearboxes

Below: The first of the 720 b.h.p. diesel-hydraulic express trains of the New South Wales Government Railways



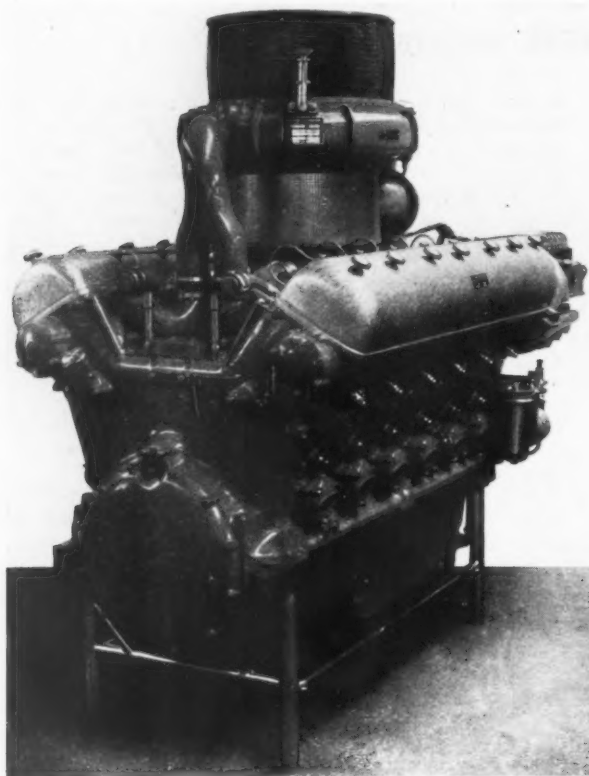
MORE deliveries and activity in the Australasian sphere than ever before are to be recorded for 1937, and it appears as if the work being performed by the New South Wales trains and Western Australian cars will force home the advantages of diesel traction throughout the continent.

In Western Australia the Government Railways took delivery of an Armstrong-Whitworth railcar and of five engine-transmission sets, bogies and chassis; a spare engine-generator set was also sent out. The bodies for five cars have been built at the railway shops at Perth, so that the Government lines now have six cars and a spare power set. The power unit is an Armstrong-Saurer 140 b.h.p. engine with C.A.V.-Bosch pumps and starters, coupled to a Laurence Scott d.c. generator, the set running at a full-load speed of 1,500 r.p.m., and being mounted on a subframe which can be rolled sideways off the main underframe after the breaking of but a few joints. The cars themselves seat 40 passengers and have lavatory and luggage space; they are fitted with centre couplers and will pull light trailers of special construction which are being built in Australia.

The origin of the five-car diesel-hydraulic trains of the New South Wales Government Railways (see issue of this Supplement for October 29, 1937) lay in the desire to eliminate mixed train services, increase the schedule speed, and improve the passenger comfort, more particularly over the inland sections. A total of five power cars, two parcels and light goods vans, and 12 passenger cars have been built, and the marshalling of the trains is arranged according to requirements, one power car normally being considered as spare. Two of the power cars have been

geared for a top speed of 80 m.p.h. and three for 70 m.p.h.; they weigh 57½ tons. Two Harland-B. & W. two-stroke 360 b.h.p. engines are mounted in each power car; each engine drives the inner wheel of a bogie through a Voith-Maurer flexible coupling, step-up gears, Voith-Sinclair converter, and final drive reversing bevels. The auxiliary power for the train is provided by two 34 b.h.p. National four-cylinder oil engines direct coupled to 22 kW. G.E.C. (British) compound generators. The passengers trailers of the train are fabricated largely of aluminium supplied by the Aluminium Union Limited. The first two trains began the *Silver City Comet* service between Parkes and Broken Hill at the end of September, 1937, and by the beginning of December had covered 13,000 miles at a fuel consumption, including the auxiliary engines, of 2.5 m.p.g.; these trains are made up of three cars, and the overall speed is 46½ m.p.h. A further programme of light railcars and railbuses having petrol engines is being pushed ahead and there is progress also in Queensland and Victoria.

In New Zealand, the Government Railways are to supplement the working of the six petrol and three diesel cars, all with Leyland engines, by six double-bogie double-engined 260 b.h.p. cars with Leyland oil engines and hydraulic transmission. The Drewry Car Co. Ltd. supplied an 0-4-0 diesel locomotive with a 100 b.h.p. Gardner engine, Vulcan-Sinclair fluid coupling and Wilson gearbox to the Ohai Railway in New Zealand, and is building two 0-4-0 75 b.h.p. locomotives and seven 0-6-0 locomotives for the Government lines; the last-named are to be fitted in New Zealand with 120 b.h.p. Leyland petrol engines.



600 b.h.p. 12-cylinder Maybach engine fitted with Büchi supercharger

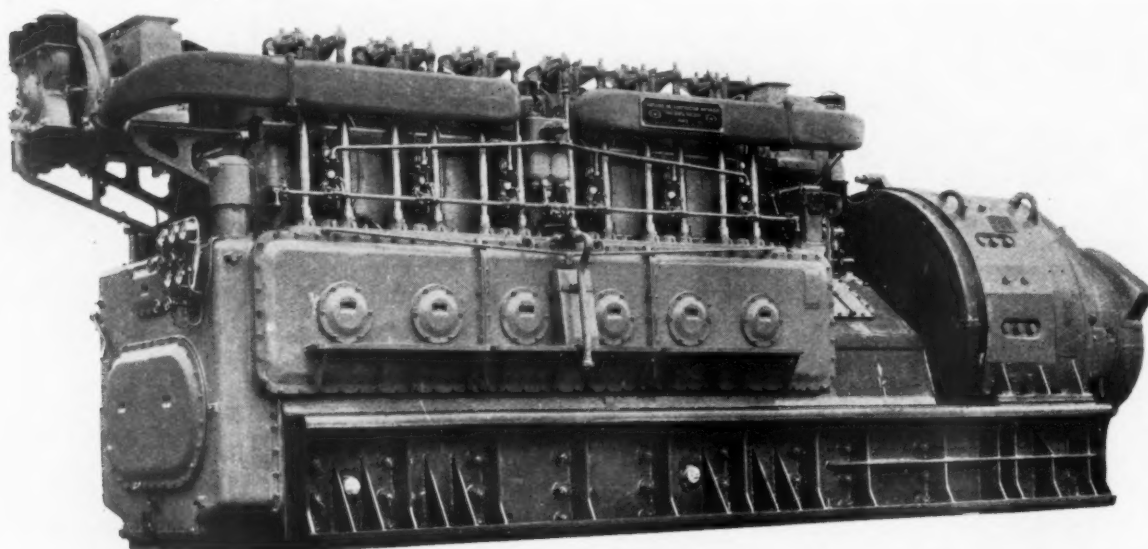
CONSIDERABLE interest attaches to the work of engine builders during the past twelve months. In that period an advance of 50 per cent. was made in one step on the maximum power per engine in non-American countries; distinct progress was made in the use of horizontal engines, principally in Germanic coun-

ENGINES AND SUPERCHARGERS

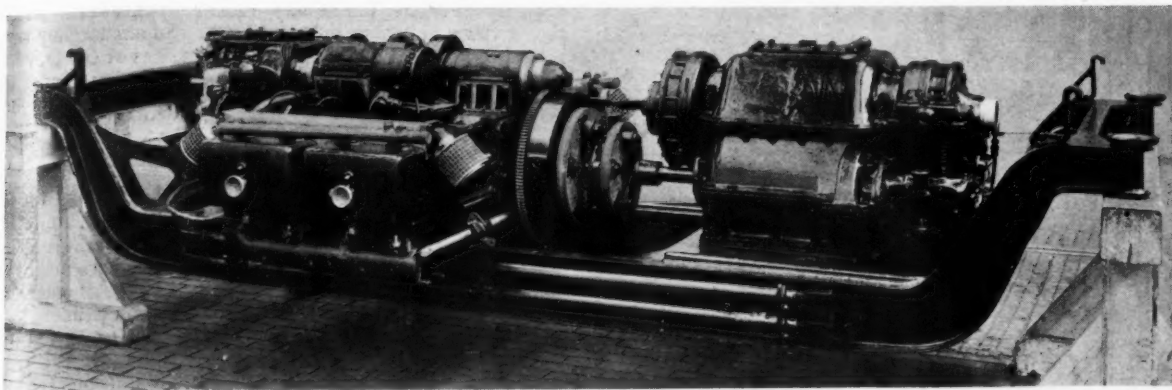
Extending use of larger engines, horizontal engines, and superchargers, form features of the year's work

tries; the two-stroke engine continued to advance steadily in numbers, if not very appreciably in the sphere of its adoption; and supercharging became accepted as a regular feature of design, rather than an experimental fitting. There was no general trend in the further reduction of unit weight during the year, apart from that which is inseparable from the use of a supercharger, but there was a tendency for the average power per engine to increase, although taken over the whole world it was not very noticeable.

An event of the year was the production of the two Sulzer 12-cylinder twin-bank engines for installation in the first of the two 4,400 b.h.p. locomotives for the P.L.M. Railway. Each vertical bank of six 12·2 in. by 15·4 in. cylinders has its own crankshaft, and the two shafts drive a single main generator through step-up spur gearing. The engine has two Rateau turbo-blowers providing supercharging at a full load pressure of 5 lb. per sq. in., and with these in operation at about 11,000 r.p.m. with an engine speed of 700 r.p.m. the engine output is 2,200 b.h.p., giving a brake m.e.p. of 115 lb. per sq. in. and a piston speed of 1,795 ft. per min. The construction of the engine framing is a combination of casting and welding, and, exclusive of the welded steel underbed which carries the engine and generator, the weight is about 21 lb. per b.h.p. The design and construction of this engine are worth the closest study by those interested in high-power diesel locomotives; a description and illustrations were given in our issues of May 14 and June 11, 1937. Engines of similar power are being built at Sulzer's Winterthur works for installation in a locomotive for the Roumanian State Railways. Further locomotive oil engine work has been done by the French Sulzer company with



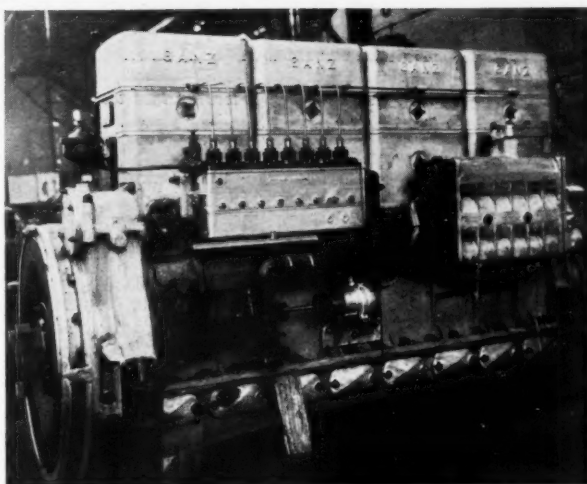
Sulzer 12-cylinder 2,200 b.h.p. supercharged engine with attached main generator



180 b.h.p. D.W.K. horizontal engine and T.A.G. transmission mounted on subframe for slinging beneath the railcar floor

supercharged engines of 635 and 720 b.h.p. for France and Algeria.

Another notable high-power engine of the year was the eight-cylinder M.A.N. unit installed in a new four-car express oil-electric train on the Reichsbahn. It is fitted with a Büchi supercharger supplying air at a pressure of $4\frac{1}{2}$ lb. per sq. in. and develops 1,400 b.h.p. at 700 r.p.m. in cylinders 11.8 in. by 15.0 in. The weight is about $17\frac{1}{2}$ lb. per b.h.p. This engine is mounted on the underframe of the train, but the Reichsbahn is still putting into service many high-speed trains with bogie-mounted engines, and 14 triple-car trains with 600 b.h.p. Maybach engines fitted with Büchi superchargers are being delivered. This 600 b.h.p. Maybach engine, which was awarded a *Grand Prix* at the Paris exhibition last year, has been ordered also by the Belgian National Railways for the six triple-car trains now being built. Both M.A.N. and Maybach supplied a number of their 410-420 b.h.p. 12-cylinder vee engines to the Reichsbahn, and also the smaller engines of 150 to 225 b.h.p. M.A.N. have delivered over 20 six-cylinder vertical engines of 360 b.h.p. to the Reichsbahn and German private lines, and some of these have Büchi superchargers to raise the output to 490 b.h.p. at the same speed of 900 r.p.m. The six cylinders are 7.9 in. by 11.8 in. A large number of Ganz-Jendrassik engines were installed in railcars and trains

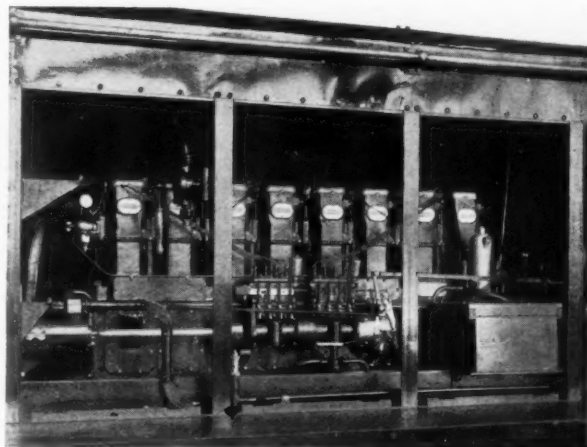


Ganz engine with top output of 410 b.h.p. as being supplied to the Central Argentine Railway

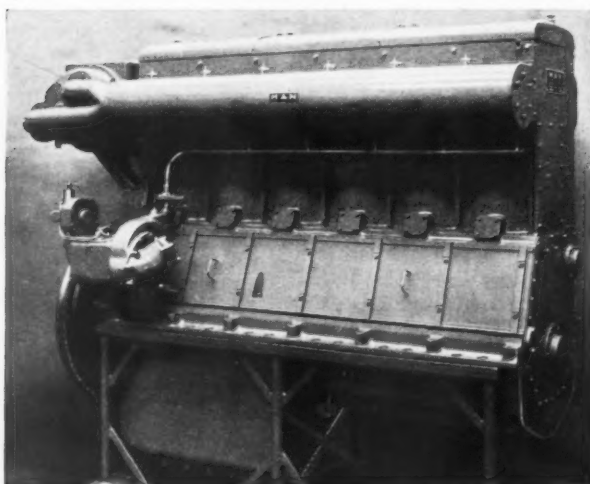
during the year, principally on the 275 and 410 b.h.p. sizes; these figures are the maximum outputs and the engines are usually considered as being of 240 and 320/360 b.h.p. Among the larger sizes of Deutz railcar engines were five of the 360 b.h.p. 12-cylinder vee model and four of the same type but with the output raised to 450 b.h.p. by the use of a Büchi supercharger.

In the smaller railcar engine range the astonishing progress of the Gardner engine must be noted. Orders for 222 engines for railcars and small locomotives were booked during 1937, the aggregate horsepower being 23,250. Most of these engines are of the six-cylinder 100 b.h.p. size, and 108 of them are being installed in the Drewry cars for Argentina. The English Electric Co. Ltd. has brought up to date its 180 b.h.p. railcar oil engine first used in 1933, and the new model is incorporated in the suburban oil-electric trains of the Ceylon Government Railways. Other British four-stroke railcar oil engines supplied during 1937 were the 275 b.h.p. Armstrong-Sulzer engines for the Central Argentine Railway cars, and Leyland engines to New Zealand, Brazil, and Argentina.

In the small and medium-powered locomotive range, 30 Paxman engines were delivered in powers from 22 to 180 b.h.p., including four 160 b.h.p. engines for Air Ministry locomotives. A popular size was the 65 b.h.p. model running at 1,000 r.p.m., and illustrated in this article. Leyland engines are being used in some Drewry locomotives for New Zealand, and McLaren, Ailsa Craig, Gleniffer, Bagnall-Deutz, Armstrong-Saurer, Crossley,



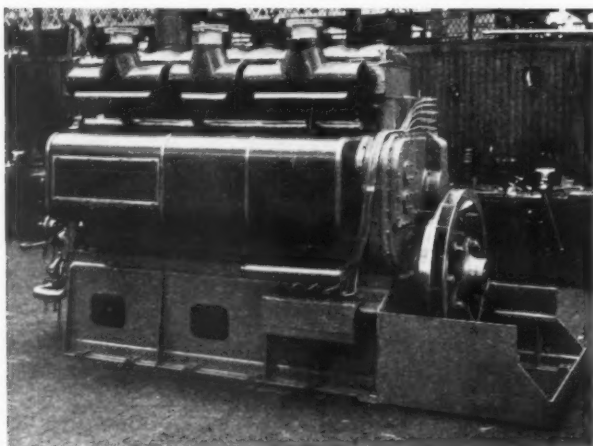
200 b.h.p. Gardner engine equipped with Visco air filters installed in Hunslet locomotive



*Büchi-supercharged M.A.N. engine with welded steel framing.
The output is 490 b.h.p. at 900 r.p.m.*

Ruston, and Atlantic oil engines in sizes up to 180 b.h.p. have been used in British-built locomotives, and Deutz engines continue to be favourites abroad for locomotives of 20 to 360 b.h.p.

The extended use of the horizontal engine can be traced back to the success of the first Deutsche Werke Kiel eight-cylinder 180 b.h.p. engine in 1935, and since that time D.W.K. in conjunction with M.A.N., Daimler-Benz, Deutz, and the Reichsbahn has evolved the German standard 12-cylinder horizontal engine developing 275 b.h.p. at 1,500 r.p.m. Not only is the standard engine being used widely in Germany in conjunction with mechanical and hydraulic transmission, but it is being quoted by German firms for export, and some of the Deutz type are being installed in trains for Brazil, and others of the D.W.K. type have gone to Norway. The Vomag horizontal engine also is being used in its single bank 200 b.h.p. form in conjunction with Mylius mechanical transmission, and in France the celebrated C.L.M.-Junkers two-stroke opposed-piston engine is being developed into a horizontal model in the 250 b.h.p. size. In England an advance was made in 1937 by the introduction of the Tillings-Steven eight-cylinder *vis-a-vis* engine with an output of 110 b.h.p. at 1,650 r.p.m., and although this

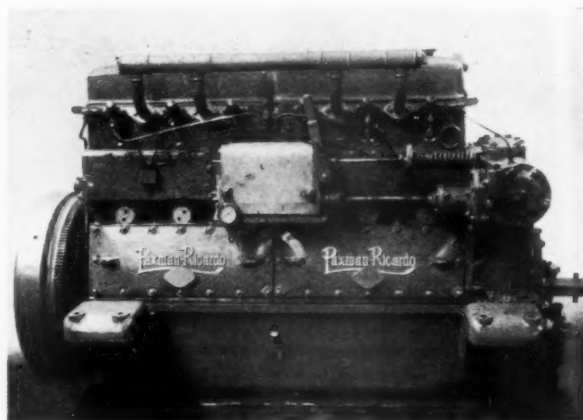


400 b.h.p. Harlandic engine

capacity severely limits any railcar applications, higher power developments are in progress. Supercharging trials have been carried out on horizontal engines of the D.W.K. type, and there is no reason why this feature should not become common in engines fitted below the railcar floor.

Two-Stroke Principle

Two-stroke railway oil engines still are confined to five makes (or three systems), *viz.*, Burmeister & Wain, Harland-B. & W., Winton, Junkers, and C.L.M.-Junkers. The Junkers types are on the opposed-piston principle, but the other makes have scavenging ports encircling the cylinder barrel and exhaust ports in the cylinder head, although at one time Burmeister & Wain used an exhaust piston valve driven from an eccentric. During the year, Harland & Wolff completed the delivery of the ten 360 b.h.p. eight-cylinder engines for the trains of the New South Wales Government Railways (see January 22, 1937 issue of this Supplement), and also a 400 b.h.p. and a 600 b.h.p. engine for the Canadian Pacific Railway, the first being installed in a railcar and the second in a loco-



65 b.h.p. Paxman engine as used in numerous small shunting locomotives

motive. The 400 b.h.p. engine, illustrated herewith, has eight cylinders 5.9 in. by 9.85 in. A 500 b.h.p. engine also was installed in the locomotive supplied by Harland & Wolff Limited to the Belfast & County Down Railway. The Winton engine was incorporated in over half the total diesel locomotive and train deliveries in the U.S.A. during 1937, but the models used were the existing standard 600, 900, and 1,200 b.h.p. sizes, all running at 750 r.p.m.

Superchargers for railway oil engines are made in four systems, the Büchi and Rateau turbo-chargers, the Centric eccentrically-driven blower, and the Roots gear-driven blower; the last-named is used only in America. Supercharging developments in 1937 extended not only to the very high power range (2,200 b.h.p.) but also down to the other end of the scale, where satisfactory applications of the Büchi and Centric systems have been made to 120-130 b.h.p. railway type engines. The usual power increment with superchargers in railway practice is from 30 to 40 per cent. but with the Büchi system an increment of 100 per cent. has been obtained on test and 50 per cent. for normal operation. Trials with the Büchi system have been made recently on 130 b.h.p. Leyland and 90 b.h.p. Saurer engines and brake m.e.p.'s up to 150 lb. per sq. in. have been obtained without a smoky exhaust.

DIESEL TRACTION IN ASIA AND AFRICA

Slow progress despite almost unlimited possibilities in all fields



480 b.h.p. Ganz twin-car rake on the Egyptian State Railways

IT is a curious fact that on two of the largest land-masses in the world diesel traction has made little progress compared with smaller, if more civilised, areas. That the British possessions in Asia and Africa are not only far behind European countries in their appreciation of the merits of diesel railcars and locomotives, but also in this matter less advanced than the neighbouring and similar colonies of other European Powers, is to be regretted. Contrast the position in India, where there is every type of country and condition, and about a dozen railcars for 300,000,000 inhabitants, with Indo-China with 16 cars for 20,000,000 inhabitants, or the progressive development in French Africa with the nibbling at oil engine traction which characterises the British Empire in that Continent. Perhaps a redeeming feature is that British manufacturers still have large orders from these parts to look forward to.

By far the most important advance in Africa or Asia during 1937 was the introduction of the ten twin-car Ganz rakes on the Cairo—Helwan line of the Egyptian State Railways, over which suburban route they are now working the whole of the passenger traffic. The single-unit cars (delivered in 1935) which previously operated a partial railcar service on this line have been transferred to other routes. Each of the two-car trains has a 240 b.h.p. engine and five-speed mechanical transmission at each end, and following usual Ganz practice they are mounted on non-bolster bogies. Each rake seats 164 passengers in two classes, and there is a luggage and a postal compartment and two lavatories.

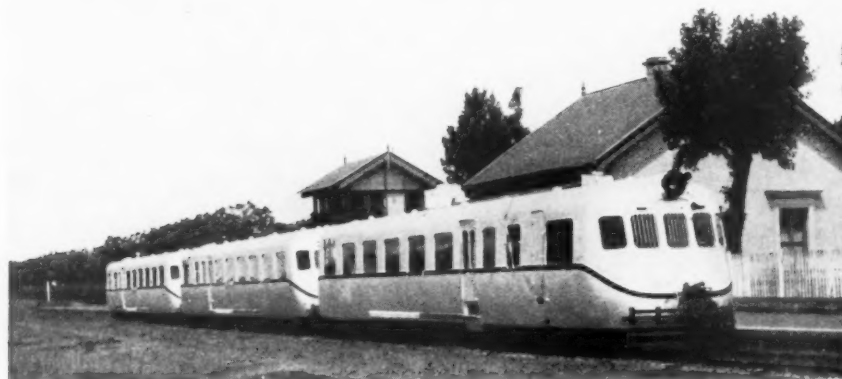
Further along the North African coast, the Algerian Railways made an advance in the power of their railcars by putting into traffic five of the Renault standard 300

b.h.p. bogie cars with ventilating and interior equipment suited to a warm climate. The previous diesel cars had been of a small and light type with engines of only 100 b.h.p. To some extent the Algerian order was hastened by the success of the Renault cars on the Tunisian Railways (see issue of this Supplement for September 4, 1936), and the Tunisian system itself is now introducing some De Dietrich 400 b.h.p. articulated sets with Saurer engines and multiple-unit control. These new sets are being used on the metre-gauge lines in the southern half of the country and have a maximum axle load of only nine tons. Progress is being made also in French West Africa by the introduction of oil-engined cars for a variety of traffics, including some with sleeping accommodation for Europeans so that long inland journeys from the coast can be made at night instead of in the heat of the day. Diesel locomotives are being built for service on the metre-gauge lines in Madagascar.

Two heavy 12-wheeled oil-electric cars with Burmeister & Wain two-stroke engines were built by Nydquist & Holm for the Iranian Government Railways (see issue of this Supplement for August 6, 1937), and six 265 b.h.p. Renault cars began to run on the Indo-Chinese State Railway. Several small light-weight cars were acquired by small Japanese private lines, and the South Manchuria Railway began experiments with Voith hydraulic transmission. At the end of the year, the first of the English Electric four-car trains was shipped to Ceylon but no diesel units were actually put to work during 1937 in either India or Ceylon. The Nizam's State Railway placed an order for four Drewry cars with two power-transmission sets, and other Indian lines have ambitious programmes in their budgets.

THE YEAR IN SOUTH AMERICA

Argentina and Uruguay on threshold of £2,000,000 diesel extension programme



Three Ganz type diesel-mechanical railcars coupled in multiple unit, B.A.P. Railway

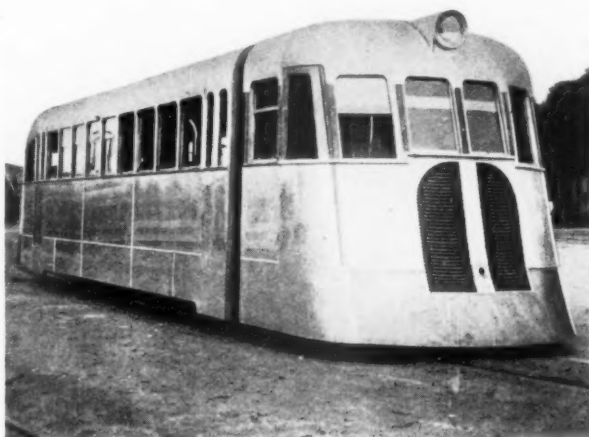
IN TENSE activity was manifested by South American railways during 1937, but it was principally in the placing of orders. For example, no fewer than 220 diesel locomotives, railcars, and trains aggregating over 45,000 b.h.p. are on order already for delivery during the next twelve months. Of this total over 150 cars, 36 trains, and 15 locomotives will go to Argentina and Uruguay, and are being built exclusively in England and Hungary. It is notable that Gardner engines feature in all the English orders except for four broad-gauge locomotives.

The deliveries to South America during 1937 amounted to about 35 vehicles, most important of which were the cars sent out from England to the Central Argentine and Entre Rios Railways. Both batches were built by the Birmingham Railway Carriage & Wagon Co. Ltd. The Entre Rios order comprised 11 double-bogie cars each powered by two underframe-mounted 125 b.h.p. Gardner engines driving through Vulcan-Sinclair fluid couplings and four-speed Wilson epicyclic gearboxes with Hardy-Spicer cardan shafts and Bostock & Bramley reversing boxes. The operation of the two power sets is synchronised by means of Exactor control. The bogies are of the Birmingham patent type with welded frame structures and have axles supported in Timken roller bearing boxes; the brakes are of the Girling type with drums bolted inside the wheels. A small buffet is incorporated, and Stone's pressure ventilating and heating system is fitted.

Four double-bogie diesel-mechanical railcars and two twin-unit articulated sets made up the Central Argentine Railway's order, the cars having one and the trains two 275 b.h.p. Armstrong-Sulzer engines. Two of the railcars have Vulcan-Sinclair fluid couplings and five-speed Wilson gearboxes; the two remaining cars and the two articulated rakes have S.L.M.-Winterthur oil-operated gearboxes, but both types have Bostock & Bramley final worm drives. The underframe and body framing form an integral welded steel structure with aluminium-alloy panels and window frames and Alpax doors. As in the Entre Rios cars, Stone's pressure ventilating and heating system is incorporated in the passenger saloons, and the welded steel bogies have Timken roller bearing axleboxes and Girling brakes.

In 1936 the Buenos Ayres Pacific Railway requisitioned

six railcars of the Ganz type, the bodies and underframes of which were to be built at the railway company's Junin shops. Apart from the bogies, which are of the Kimberley patent type, the mechanical portion was built to Ganz drawings, and the engines and auxiliaries themselves were built in Budapest. Three of the cars have Ganz mechanical transmission and three have Voith-Sinclair hydraulic drive; multiple-unit control is incorporated in both types. The engines are of the Ganz standard 240 b.h.p. type. These cars were set to work in the Mendoza district in November and when going up country to take over this service the three cars with mechanical transmission were coupled in multiple-unit and run from Buenos Aires to Mendoza, 660 miles, in 10½ hr., giving an end-to-end speed of 62½ m.p.h. non-stop except for a halt of ¾ min. for signals in the Buenos Aires suburban district. The top speed was only 71 m.p.h., the fuel consumption 2,580 lb., and the lubricating oil consumption 51 lb., these figures being the aggregates for the



Metre-gauge 17-ton 130 b.h.p. car with Leyland engine and hydraulic transmission, Mogyana Railway

240 b.h.p. Ganz engine and Voith hydraulic drive on Kimberley bogie of B.A.P. railcar. The axleboxes are of the S.K.F. roller type



three cars; the fuel consumption was equivalent to 1.28 lb. per car per mile. The maximum atmospheric temperature *en route* was 25 deg. C.; the maximum cooling water temperature was 75 deg. C., and the normal difference between inlet and outlet temperatures was 7 deg. C. Towards the end of the run the cars surmounted a $1\frac{3}{4}$ -mile grade averaging 1 in 175, and with a maximum inclination of 1 in 102, at an average of 65 m.p.h.; the top of the bank is at an altitude of 2,600 ft. above Buenos Aires.

Seating accommodation for 60 passengers, together with lavatory, buffet, and postal space, is provided in each car, and the layout generally is to suit operation over distances of 120 miles or more. The tare weight is 35 tons and in ordinary service the speed will be limited to 62 m.p.h. Both driving and carrying bogies have the same type of suspension, and were built at the Ganz works to designs prepared by the B.A.P. Railway. The driving bogie has a wheelbase of 12 ft. $11\frac{1}{2}$ in., and as shown at the head of this page, complete with engine and hydraulic transmission, it weighs 11 tons; with mechanical transmission the weight is 12 tons. The design enables the mechanical

and hydraulic transmission sets to be changed over if required, and the main difference is that with the hydraulic drive the engine is set at a somewhat steeper inclination. Departing from original intentions, the underframes had to be built in Hungary, owing to the difficulty of getting chrome steel in Argentina. Two 130 b.h.p. diesel-hydraulic cars were also built for the B.A.P. Railway in 1937 by the Birmingham Railway Carriage & Wagon Co. Ltd.; they have Leyland engines and transmission.

In Brazil, the Mogyana Railway introduced four railcars built in its own shops, but having 130 b.h.p. Leyland oil engines and Leyland hydraulic transmission sent out from England. The power bogie and its equipment is articulated to the passenger portion in the fashion originated years ago on the Clogher Valley Railway. The design of these cars was described in the issue of this Supplement for February 26, 1936. Two 100 b.h.p. Walker cars were shipped to the São Paulo Railway in 1937; they have the type of articulation just mentioned, which has been developed and standardised by Walker, and a Cotal gearbox takes up the engine torque.



275 b.h.p. diesel-mechanical car with Armstrong-Sulzer engine on the Central Argentine Railway

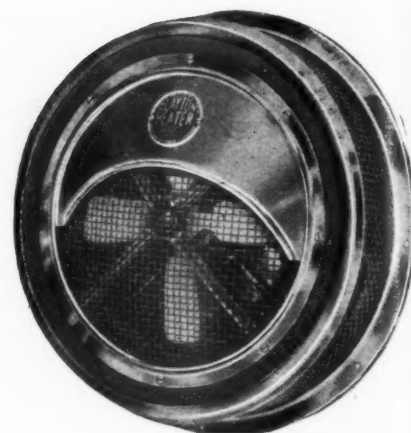
ENGINE AND MECHANICAL EQUIPMENT

A short review of recent practice

ALONG with the general standard of railcar and locomotive design and construction, the auxiliaries, equipment, and fittings which go to improve the efficiency of the power unit or increase the passenger comfort show a constant advance, and an appreciation of their merits and demerits is becoming more widely realised throughout the railway world, where previously there was little but scepticism.

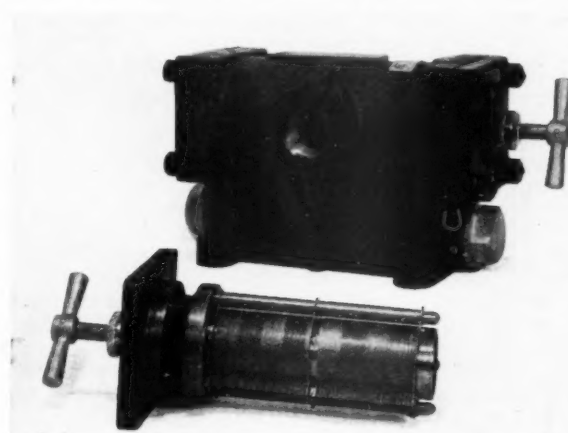
Of the adjuncts to the engine, none is more important than the fuel injection pump, and apart from a few engine makers, such as Ganz, who still make their own, the Bosch and C.A.V.-Bosch types are almost universal, even for engines well above the power of the largest road vehicle type. Scarcely inferior in importance are the fuel oil and air filters, particularly in countries where there is a dusty or sandy atmosphere. The fuel itself usually is passed through a fine-mesh filter as it enters the tank, and it is advisable to introduce another, such as the Auto-Klean or Zwicky, in the fuel line between the tanks and the final C.A.V.-Bosch type edge filters incorporated in the pumps of the same make. There is a commendable tendency nowadays to insert special self-cleaning filters in the lubricating oil circuits, two of the best-known makes for this purpose being the Auto-Klean and Stream-line; an occasional turn of a small handle is all the running attention required by these fittings. Both the static and self-cleaning principles are applicable to air filters; for smaller powers the filters may simply be attached directly to the engines, as with the Visco filter attached to a 200 b.h.p. Gardner engine as shown on another page. In large vehicles, and where the atmosphere carries much foreign matter, it is usual to fit large filter panels of such types as the Vokes Protectomotor on the side of the vehicle where the air is first introduced to the engine room, and often to supplement this by smaller Vokes, Visco, or Premier Adhesive filters on the engine.

Radiators of the sectional type are now almost standard for the majority of applications, and a certain number of elements are allocated to the cooling of the engine lubricating oil. The construction of the various

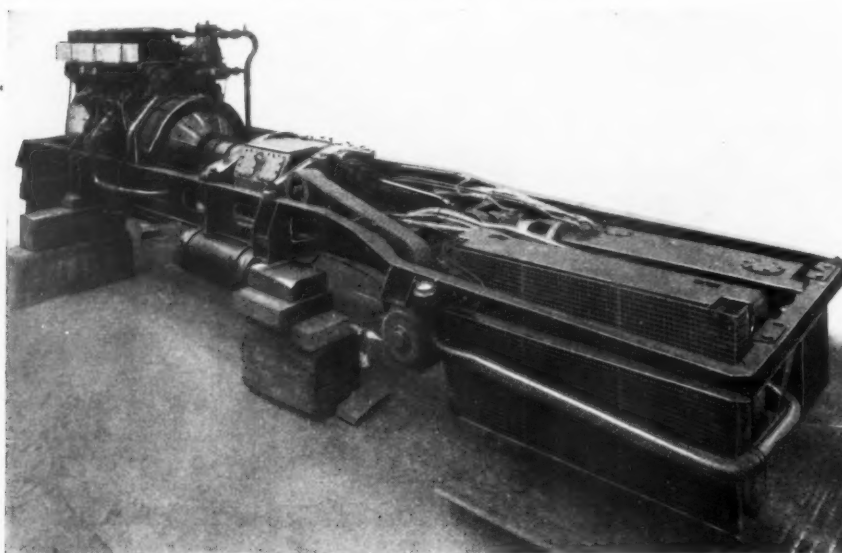


Clayton heater for railcars

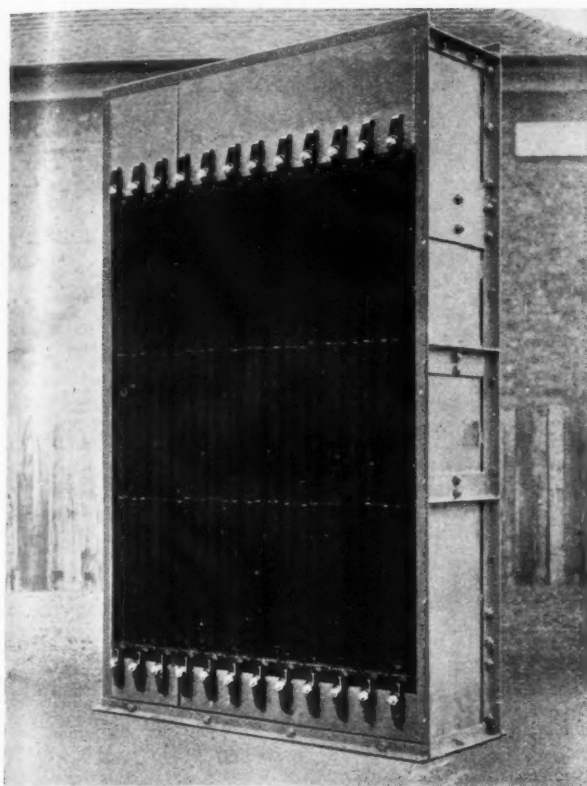
makes is on different lines; the Spiral Tube combined water and oil cooler for the Ceylon diesel-electric trains, as illustrated herewith, is largely fabricated from rolled steel sections and has no soft-soldered tube joints. Some of the Spiral Tube roof coolers supplied to Ireland have



Above: Auto-Klean filter for lubricating oil



Left: In the foreground are the Serck sectional radiators and Brammer belt auxiliary drive of the Birmingham-built Central Argentine cars. In the background are the 275 b.h.p. Armstrong-Sulzer engine, Vulcan-Sinclair fluid coupling, and Wilson gearbox



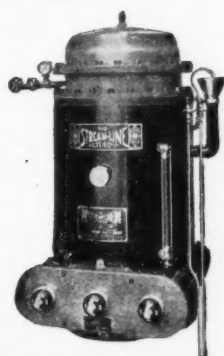
Above: Spiral Tube radiator with water and oil-cooling elements for 180 b.h.p. English Electric engine installed in Ceylon trains

Right: Cochran Sinuflo exhaust gas boiler for the heating of railcars

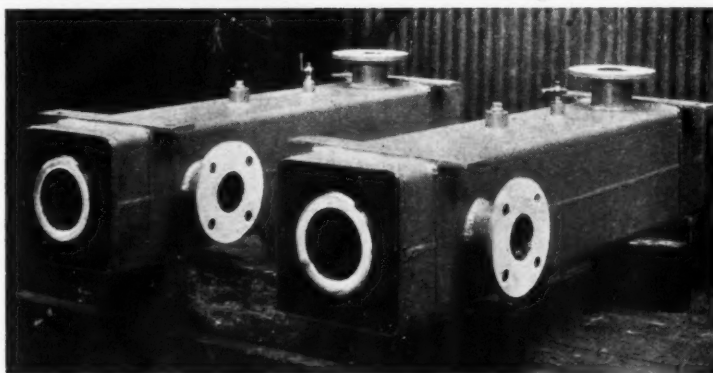
silicon alloy headers and copper spiral tubing silver brazed into the tubeplates. The Serck design makes use of flattened copper tubes, and the sectional elements can be arranged in a variety of manners and sizes to suit the individual requirements of diesel locomotive manufacturers or railways. In large locomotives the fans usually are driven by electric motors, but in shunters and in railcars the common drive is by the Renold type of chain or by Brammer belts.

On the Continent, heating of railcars, where they are too big to be heated by the engine cooling water or exhaust gases circulated round the car, is frequently effected by anthracite or coke burning hot water stoves, but British-controlled practice favours exhaust gas boilers of the Cochran Sinuflo or Clarkson types, or by oil-fired boilers of the Gresham & Craven Vapor or Clarkson classes where trailers have to be hauled, or by the air heater of the Clayton pattern used so widely in road vehicles. Windows in the passenger saloons are bound up with the type of ventilation used and the climate; among the widely-used full drop types are the Beclawat Solano and Widney Atlas, and the Widney window makers also have a totally

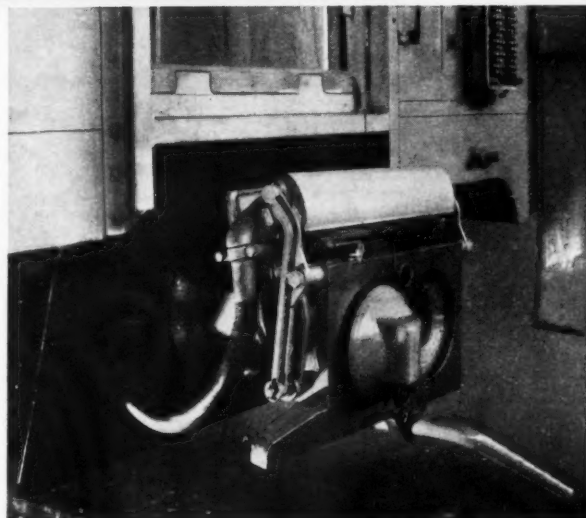
weatherproof Simplastic glazed metal frame for non-opening windows. Half-drop windows may be exemplified by the Quicktho and Beclawat Typhoon types. Although full-air conditioning is not very popular for railcars, due largely to expense (the Ganz and Carrier types are the only ones used so far), there is a rapidly widening application of a simpler form of pressure ventilation and heating such as the Stone type. If any one mechanical portion detail could be said to have contributed to the general success of railcars it is roller-bearing axleboxes, and there are few cars indeed which have not one or other of the three best-known makes, viz., Timken, S.K.F., and Hoffmann. Over 150 diesel railcars ordered in 1937 are to have Timken roller bearing axleboxes. Another constituent increasing in favour is the Scharfenberg automatic coupling, carrying the mechanical, pneumatic, electric, and water circuits. One recent model is shown at the bottom of this page.



Streamline lubricating oil filter as applied to numerous diesel railway vehicles



Below: Scharfenberg automatic coupler as used between the cars of the new four-car Reichsbahn diesel-electric train



RAILCAR PRACTICE IN ROUMANIA

Four-wheeled diesel cars on local service show operating and repair costs of 4½d. a mile compared with 6½d. a mile with petrol cars, and are being built at the rate of 40 a year

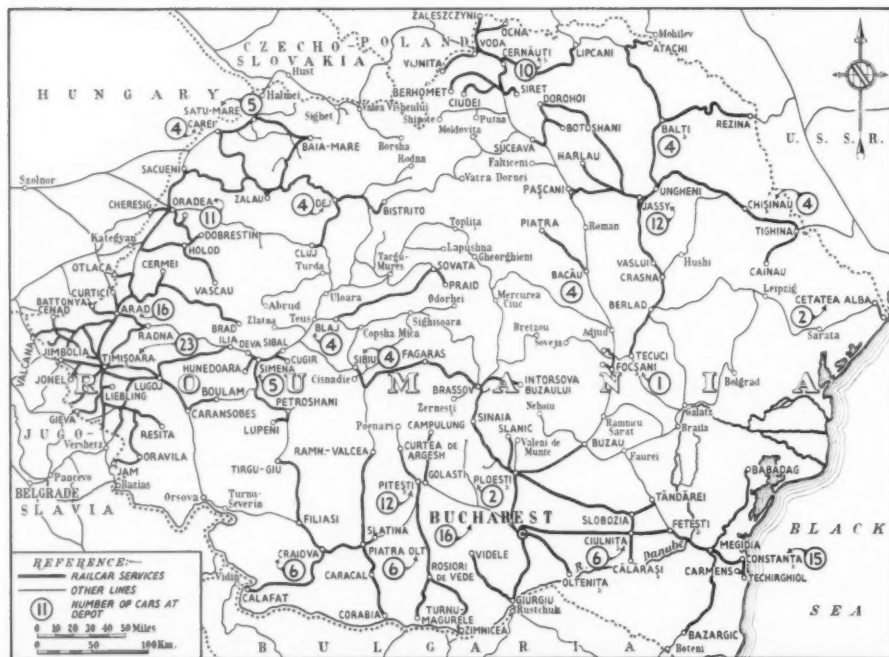


A group of 150 b.h.p. four-wheeled Ganz cars

It is almost four years since the Roumanian State Railways put into traffic their first diesel vehicles, after having had practically 30 years' previous experience with petrol railcars. Seventeen petrol-engined railcars were built in 1934-35, but since that time all railcars have been of the diesel type with M.A.N., Ganz, or Deutz engines, and of the total stud of 200 railcars in 1937, 152 were diesel, 40 being of the petrol type and eight of the Sentinel-Cammell steam variety. The mechanical portions of practically all the diesel vehicles have been made by the Roumanian firms of Malaxa and Astra, but it has been the practice to import the engines and transmission equipment. All the diesel cars have mechanical transmission, 59 being provided with Mylius drive in conjunction with M.A.N. and Deutz engines, 78 with Ganz engine and transmission equipment, and 15 with T.A.G. transmission in conjunction with M.A.N. engines. All the diesel cars except four are of the four-wheeled pattern with 120 to 170 b.h.p. engines and a service weight of

18½ to 27 tons, and all are arranged for trailer haulage and have a driving cabin at each end.

Originally trials were made with an engine mounted on a carriage underframe, but this proved unsatisfactory, and subsequent vehicles have all been new. The requirements were an accelerated schedule speed compared with steam trains in local service, reduced operating cost, low weight per seat, and a low train resistance. S.K.F. roller bearing axleboxes are standard for all cars. Fast main line services with Ganz twin-car sets were begun in 1937 between Bucharest and Brassov and Bucharest and Constantza; normally it is considered that 176 railcars are in service and they are distributed over 23 depots as indicated on the accompanying map. In 1937 about 3,675 route miles, or 53 per cent. of the total system, had diesel railcar services. The average daily mileage per railcar varied from 125 to 145 with a maximum of 186, all these figures relating to the four-wheeled cars which operate local traffic. More big cars of the Ganz-Mylius type are ordered.



Map showing lines of Roumanian State Railways over which railcar services are operated. The total is about 4,000 route miles, of which diesel cars operate on 3,675 miles. The diesel car mileage is now in excess of 5,000,000 a year, and the total railcar mileage over 6,000,000 a year, worked from 23 sheds as shown

A RECORD YEAR IN AMERICA

Over £2,500,000 worth of orders placed

By RODGER L. SIMONS

AS every observer of the subject is well aware, the American railways are in a grievous plight financially, despite the fact that they are run in an extremely efficient manner and that the great majority show a profit on operating. One result of this critical state of affairs has been that during the past year American railways have gone in for diesel power on a bigger scale than ever before. It is true that there have not been as many spectacular trains and locomotives as in 1936, but in the hard, solid revenue-earning capacity and in the elimination of waste in duties normally paying little or no money, diesel traction has been pushed ahead rapidly.

There were built for home service in the U.S.A. during 1937 a total of almost 160 diesel locomotives, plus 8 for export; the orders also totalled over 150 locomotives. Within the eight weeks of December, 1936, and January, 1937, American railroads ordered diesel trains and locomotives to the value of over £1,000,000, and similarly in the period from the beginning of December last orders worth over £750,000 have been placed, and the total value of the diesel orders in 1937 handsomely exceeded £2,500,000.

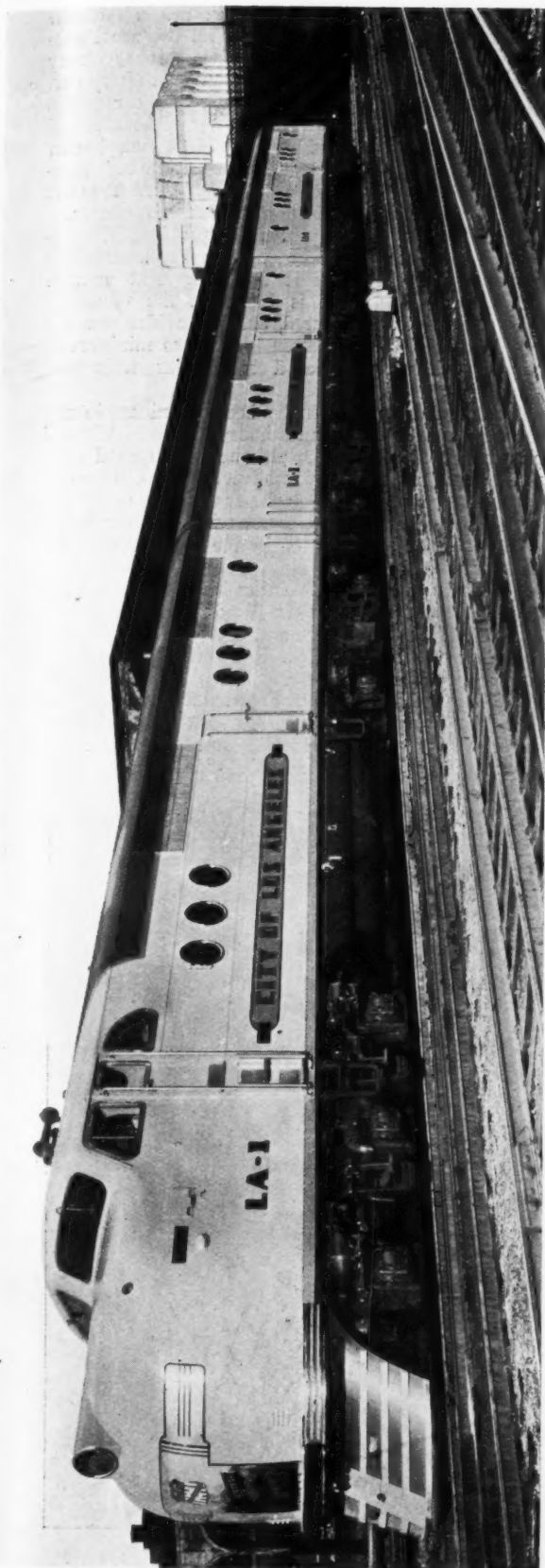
The first important high-speed diesel debut of 1937 was the inauguration on May 18 of service with the new 3,600 b.h.p. Super-Chief of the Atchison, Topeka and Santa Fé system. Following the trial of the earlier Super-Chief on the Santa Fé line, the new nine-car train maintains a 39½-hr. schedule between Chicago and Los Angeles. The locomotive consists of two 1,800 b.h.p. units each in turn made up of two 900 b.h.p. diesel power plants, and all four engines are coupled for simultaneous control from the main locomotive throttle. On each six-wheeled bogie of the locomotive sections are two General Electric traction motors, geared directly to the outer axles, the centre axles being idlers and used only to help carry the weight. [See issue of this Supplement for August 6, 1937].

Astern of the locomotive is a mail-sorting car, another car for mail and baggage storage, and seven passenger coaches. One is assigned to cocktail lounge, barber shop and crew's quarters. Another is a diner, four cars are devoted to drawing rooms, compartments and the conventional American Pullman sections; and the last is made up of drawing rooms and an observation lounge at the stern. To comport with the territory through which the Super-Chief runs, the decorations in the public rooms are in the Navaho Indian motif.

Right at the end of the year, the Santa Fé placed an order for two more 3,600 b.h.p. and five 1,800 b.h.p. oil-electric locomotives at a cost of one and three-quarter million dollars, apparently with the intention of diesel-hauling all its main Chicago-California trains. At the same time, 17 stainless steel cars for these services were ordered from Budd. Altogether, the Santa Fé ordered 17 diesel locomotives with an aggregate output of 26,200 b.h.p. during 1937.

Coincident with the new Super-Chief came the two 3,600 b.h.p. diesel-electric locomotives ordered by the Baltimore & Ohio Railroad to haul their fast train, the Capitol Limited, between Chicago, Washington, and New York. To facilitate handling in the yard and on the turntable, the new locomotives are built in two non-articulated sections, each with two 900 b.h.p. power units. At

The latest American triple-unit locomotive for 2,000-mile continuous runs. It has six engines totalling 5,400 b.h.p.



the forward end of the second locomotive section is an auxiliary set of controls for its operation when disengaged from the main member. [See issues of this Supplement for April 16 and July 9, 1937.] During the break-in tests in June, the first of the two new B. & O. locomotives did a non-stop sprint of 551.4 miles from Cincinnati to Washington, one of the longest non-stop runs ever made by a train east of the Mississippi. On most of the trip only three engines were used, the fourth being cut in only for the heaviest grades, such as crossing the Allegheny Mountains at a maximum altitude of 2,622 ft.

Inaugurating diesel service on a rather extensive scale, the Chicago Rock Island & Pacific Railroad introduced six diesel-hauled trains on its interurban passenger service around the Chicago area and on longer runs radiating out of that city and Kansas City. Heretofore the prevailing practice in the design of America's fast diesel trains had been to let the locomotive be almost integral with the rest of the train, even to so superficial a detail as the exterior colour scheme. But the Rock Island road has formed its 1,200 b.h.p. Rocket locomotives as entirely separate units, capable of being coupled with a three- or four-car train, as traffic dictates, and this practice is being followed now by the Santa Fé and B. & O.

That hardy perennial and pioneer in diesel speed demons, the Union Pacific, received a new locomotive for their newest train, City of Los Angeles, and this went into service at the latter part of December. Another new power unit for the sister train, City of San Francisco, is expected to enter service early this year. Each of these trains will be seventeen cars in length, almost a quarter of a mile, which its owners claim to be the longest streamliner in the world.

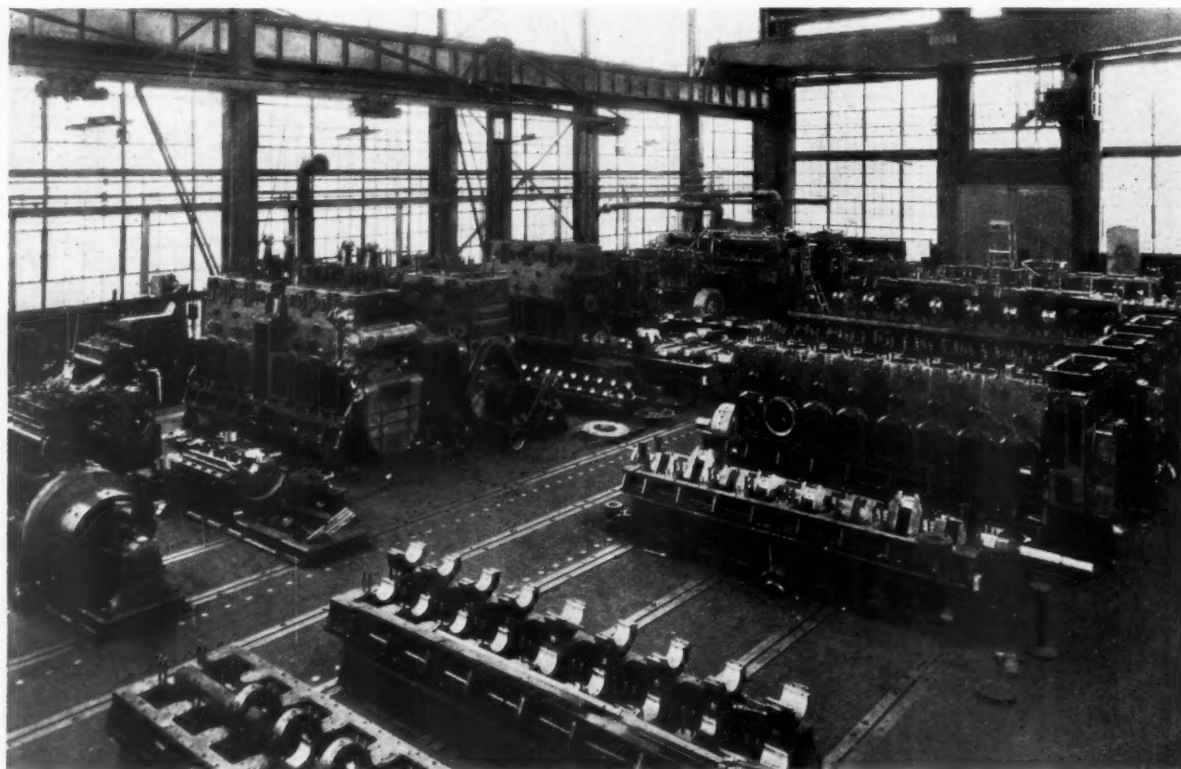
The new locomotives are each in three sections, with two 900 b.h.p. Winton engines apiece, all six engines

being brought to a common control in the cab of the driving unit. And instead of carrying all the usual subsidiary apparatus in the locomotive space, this machinery is localised in a so-called auxiliary-baggage-dormitory car, just aft of the third locomotive section. This car carries such equipment as auxiliary engine, power generators and storage batteries to operate the air-conditioning telephones, lighting, and radio. The weight of each triple-unit locomotive is 390 Engl. tons. The second and third units are arranged for independent operation in yard movements.

Special attention has been given the problem of negotiating curves at high speed with such lengthy locomotives by a special system of bogie springing and control. Another interesting advance is found in the unusually comfortable, deeply upholstered chair provided for the driver, it being felt that to lessen his fatigue ministers to greater vigilance and increased safety for train and occupants.

The Burlington Line has usually been prominent in any list of new diesel equipment, but it has not placed additional streamliners in service in 1937, although it acquired eight heavy oil-electric switching locomotives. It has, however, ordered eleven new stainless steel passenger cars for the Zephyr service in 1938. And these, with the new Union Pacific train promised for early in the year, should see 1938 well-launched with new diesel power in America.

Among the largest of the shunting locomotives ordered were two of 1,000 b.h.p. for the Ford Motor Company, with Cooper-Bessemer engines, and several single-engined Alco locomotives of 900 b.h.p., for which Büchi super-charging equipment is now considered more or less standard. The Elgin, Joliet & Eastern Railroad ordered a total of 13 oil-electric locomotives of 600 to 900 b.h.p., the Lehigh Valley six, the Rock Island 11 switchers of 600 b.h.p., and the South Buffalo nine.



Interior of the Cooper-Bessemer plant, showing railway and other oil engines under erection